

APPENDIX 8.1B

Calculation of Maximum Hourly, Daily, and Annual Emissions

Calculation of Maximum Hourly, Daily, and Annual Emissions

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Table 8.1B.1 Commissioning Turbine Emissions Schedule

City of Vernon
3X1 Combined Cycle Vernon Power Plant

Load Forecast for Commissioning

Updated 05/04/06

Day	CTG 1				CTG 2				CTG 3			
	Activity	Duration [hr](1)	CTG Load [%]	Modeling Load (%)	Activity	Duration [hr](1)	CTG Load [%]	Modeling Load (%)	Activity	Duration [hr](1)	CTG Load [%]	Modeling Load (%)
1	CTG Testing (Full Speed No Load, FSNL)	8	0	0	No Operation	0	0	0	No Operation	0	0	0
2	CTG 1 Testing @ 40% load	8	0-40	40	No Operation	0	0	0	No Operation	0	0	0
3	No Operation	0	0	0	CTG 2 Testing FSNL	8	0	0	No Operation	0	0	0
4	No Operation	0	0	0	CTG 2 Testing @40% load	8	0-40	40	No Operation	0	0	0
5	Extended Bypass Blowdown to Condenser/HRSG Tuning	12	0-25	25	No Operation	0	0	0	CTG 3 Testing FSNL	8	0	0
6	Extended Bypass Blowdown to Condenser/HRSG Tuning	12	0-50	50	No Operation	0	0	0	CTG 3 Testing @40% load	8	0-40	40
7	Extended Bypass Blowdown to Condenser	12	0-50	50	No Operation	0	0	0	No Operation	0	0	0
8	Extended Bypass Blowdown to Condenser	12	0-50	50	No Operation	0	0	0	No Operation	0	0	0
9	No Operation	0	0	0	Extended Bypass Blowdown to Condenser/HRSG Tuning	12	0-25	25	No Operation	0	0	0
10	No Operation	0	0	0	Extended Bypass Blowdown to Condenser/HRSG Tuning	12	0-50	50	No Operation	0	0	0
11	No Operation	0	0	0	Extended Bypass Blowdown to Condenser	12	0-50	50	No Operation	0	0	0
12	No Operation	0	0	0	Extended Bypass Blowdown to Condenser	12	0-50	50	No Operation	0	0	0
13	No Operation	0	0	0	No Operation	0	0	0	Extended Bypass Blowdown to Condenser/HRSG Tuning	12	0-25	25
14	No Operation	0	0	0	No Operation	0	0	0	Extended Bypass Blowdown to Condenser/HRSG Tuning	12	0-50	50
15	No Operation	0	0	0	No Operation	0	0	0	Extended Bypass Blowdown to Condenser	12	0-50	50
16	No Operation	0	0	0	No Operation	0	0	0	Extended Bypass Blowdown to Condenser	12	0-50	50
17	Ext Bypass Blowdown to Condenser (combined blows)	0	0	0	Ext Bypass Blowdown to Condenser (combined blows)	0	0	0	Ext Bypass Blowdown to Condenser (combined blows)	12	0-50	50
18	Ext Bypass Blowdown to Condenser (combined blows)	0	0	0	Ext Bypass Blowdown to Condenser (combined blows)	0	0	0	Ext Bypass Blowdown to Condenser (combined blows)	12	0-50	50
19	Ext Bypass Blowdown to Condenser (combined blows)	0	0	0	Ext Bypass Blowdown to Condenser (combined blows)	0	0	0	Ext Bypass Blowdown to Condenser (combined blows)	12	0-50	50
20	Ext Bypass Blowdown to Condenser (combined blows)	0	0	0	Ext Bypass Blowdown to Condenser (combined blows)	0	0	0	Ext Bypass Blowdown to Condenser (combined blows)	12	0-50	50
21	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
22	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
23	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
24	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
25	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
26	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
27	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
28	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
29	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
30	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
31	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
32	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
33	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
34	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0	Ext Bypass Blowdown restoration, install SCR/CO Catalyst	0	0	0
35	Establish vacuum/HSRG Tuning/BOP Tuning	16	50	50	No Operation	0	0	0	No Operation	0	0	0
36	Establish vacuum/BOP Tuning	16	50	50	No Operation	0	0	0	No Operation	0	0	0
37	CTG Load Test & Bypass Valve Tuning	16	50	50	No Operation	0	0	0	No Operation	0	0	0
38	CTG Load Test & Bypass Valve Tuning	16	50	50	No Operation	0	0	0	No Operation	0	0	0
39	Testing	12	75	75	No Operation	0	0	0	No Operation	0	0	0
40	CTG 1 Base Load / Commissioning of Ammonia system	12	100	100	No Operation	0	0	0	No Operation	0	0	0
41	CTG Load Test & Bypass Valve Tuning	12	100	100	No Operation	0	0	0	No Operation	0	0	0
42	No Operation	0	0	0	Testing	12	75	75	No Operation	0	0	0
43	No Operation	0	0	0	CTG 2 Load Test & Bypass Valve Tuning	12	50	50	No Operation	0	0	0
44	No Operation	0	0	0	Testing	12	75	75	No Operation	0	0	0
45	No Operation	0	0	0	CTG 2 Load Test & Bypass Valve Tuning	12	100	100	No Operation	0	0	0
46	No Operation	0	0	0	CT 2 Base Load/Commissioning Ammonia	12	100	100	No Operation	0	0	0
47	No Operation	0	0	0	No Operation	0	0	0	Testing	12	75	75
48	No Operation	0	0	0	No Operation	0	0	0	CTG 3 Load Test & Bypass Valve Tuning	12	50	50
49	No Operation	0	0	0	No Operation	0	0	0	Testing	12	75	75
50	No Operation	0	0	0	No Operation	0	0	0	CTG 3 Load Test & Bypass Valve Tuning	12	100	100
51	Install Emissions Test Equipment	0	0	0	No Operation	0	0	0	CT 3 Base Load/Commissioning Ammonia	12	100	100
52	Bypass Operation / STG Initial Roll & Trip Test	10	0-50	50	No Operation	0	0	0	No Operation	0	0	0

Table 8.1B.1 Commissioning Turbine Emissions Schedule

City of Vernon
3X1 Combined Cycle Vernon Power Plant

Load Forecast for Commissioning

Day	CTG 1				CTG 2				CTG 3			
	Activity	Duration [hr](1)	CTG Load [%]	Modeling Load (%)	Activity	Duration [hr](1)	CTG Load [%]	Modeling Load (%)	Activity	Duration [hr](1)	CTG Load [%]	Modeling Load (%)
53	Bypass Operation / STG Load Test	16	0-50	50	Bypass Operation	16	0-50	50	No Operation	0	0	0
54	CTG on Bypass / STG Load Test	16	0-100	100	Bypass Operation	16	0-100	100	Bypass Operation	16	0-50	50
55	Load Test STG / Combine Cycle (2X1)	24	0-100	100	Load Test STG / Combine Cycle (2X1)	24	0-100	100	Bypass Operation	16	0-100	100
56	Load Test STG / Combine Cycle (3X1)	24	0-100	100	Load Test STG / Combine Cycle (3X1)	24	0-100	100	Load Test STG / Combine Cycle (3X1)	24	0-100	100
57	Load Test STG / Combine Cycle (3X1)	24	0-100	100	Load Test STG / Combine Cycle (3X1)	24	0-100	100	Load Test STG / Combine Cycle (3X1)	24	0-100	100
58	Combine Cycle testing	24	0-100	100	Combine Cycle testing	24	0-100	100	Combine Cycle testing	24	0-100	100
59	Commissioning Duct Burners	24	100	100 + DB	Commissioning Duct Burners	24	100	100 + DB	Commissioning Duct Burners	24	100	100 + DB
60	Emissions Tuning	12	50-100	100	No Operation	0	0	0	No Operation	0	0	0
61	Emissions Tuning	12	50-100	100	No Operation	0	0	0	No Operation	0	0	0
62	RATA / Pre-performance Testing/Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
63	RATA / Pre-performance Testing/Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
64	RATA / Pre-performance Testing/Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
65	RATA / Pre-performance Testing/Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
66	RATA / Pre-performance Testing/Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
67	Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
68	Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
69	Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
70	Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
71	Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
72	Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
73	Source Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
74	Drift Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
75	Drift Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
76	Drift Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
77	Drift Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
78	Drift Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
79	Drift Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
80	Drift Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
81	Drift Testing	12	100	100 + DB	No Operation	0	0	0	No Operation	0	0	0
82	Remove Emissions Test Equipment	0	0	0	Install Emissions Test Equipment	0	0	0	No Operation	0	0	0
83	No Operation	0	0	0	Emissions Tuning/Drift Testing	12	50-100	100 + DB	No Operation	0	0	0
84	No Operation	0	0	0	RATA/Pre-perform Testing/Source Testing/Drift Testing	12	100	100 + DB	No Operation	0	0	0
85	No Operation	0	0	0	RATA/Pre-perform Testing/Source Testing/Drift Testing	12	100	100 + DB	No Operation	0	0	0
86	No Operation	0	0	0	RATA/Pre-perform Testing/Source Testing/Drift Testing	12	100	100 + DB	Drift Testing	12	100	100 + DB
87	No Operation	0	0	0	RATA/Pre-perform Testing/Source Testing/Drift Testing	12	100	100 + DB	Drift Testing	12	100	100 + DB
88	No Operation	0	0	0	Drift Testing	12	100	100 + DB	Drift Testing	12	100	100 + DB
89	No Operation	0	0	0	Drift Testing	12	100	100 + DB	Emissions Tuning/Drift Testing	12	50-100	100 + DB
90	Water Wash & Performance preparation	0	0	0	Drift Testing	12	100	100 + DB	RATA/Pre-perform Testing/Source Testing/Drift Testing	12	100	100 + DB
91	Water Wash & Performance preparation	0	0	0	No Operation	0	0	0	RATA/Pre-perform Testing/Source Testing/Drift Testing	12	100	100 + DB
92	No Operation	0	0	0	Water Wash & Performance preparation	0	0	0	RATA/Pre-perform Testing/Source Testing/Drift Testing	12	100	100 + DB
93	No Operation	0	0	0	Water Wash & Performance preparation	0	0	0	RATA/Pre-perform Testing/Source Testing/Drift Testing	12	100	100 + DB
94	No Operation	0	0	0	No Operation	0	0	0	Water Wash & Performance preparation	0	0	0
95	No Operation	0	0	0	No Operation	0	0	0	Water Wash & Performance preparation	0	0	0
96	Performance Testing	24	100	100	Performance Testing	24	100	100	Performance Testing	24	100	100
97	Performance Testing	24	100	100 + DB	Performance Testing	24	100	100 + DB	Performance Testing	24	100	100 + DB
98	CALISO Certification	12	50-100	100	CALISO Certification	12	50-100	100	CALISO Certification	12	50-100	100
99	CALISO Certification with duct burner	12	100	100+DB	CALISO Certification with duct burner	12	100	100 + DB	CALISO Certification with duct burner	12	100	100 + DB
	Total CTG operation hours	662				444				468		

DB - Duct Burner "ON"

(1) CTG is assumed to ramp at 3 MW per minute during Commissioning Operations

Table 8.1B.2 Siemens Commissioning Emission Rates

City of Vernon

Estimated SGT6-5000F Gas Turbine Performance
 Combined Cycle / Dry Low NOx Combustor
 SGen6-1000A / 0.90 Power Factor

USAacb_Ar6
 11/02/2005

	UNMARGINED												
SITE CONDITIONS:	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11	CASE 12	CASE 13
	Natural Gas												
FUEL TYPE	BASE	90%	80%	70%	60%	50%	40%	35%	30%	25%	20%	10%	FSNL
LOAD LEVEL	BASE	90%	80%	70%	60%	50%	40%	35%	30%	25%	20%	10%	FSNL
NET FUEL HEATING VALUE, Btu/lbm (LHV)	21074	21074	21074	21074	21074	21074	21074	21074	21074	21074	21074	21074	21074
GROSS FUEL HEATING VALUE, Btu/lbm (HHV)	23397	23397	23397	23397	23397	23397	23397	23397	23397	23397	23397	23397	23397
EVAPORATIVE COOLER STATUS/EFFECTIVENESS	OFF												
AMBIENT DRY BULB TEMPERATURE, °F	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
AMBIENT WET BULB TEMPERATURE, °F	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2
AMBIENT RELATIVE HUMIDITY, %	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
BAROMETRIC PRESSURE, psia	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600
COMPRESSOR INLET TEMPERATURE, °F	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
INLET PRESSURE LOSS, in. H2O (Total)	4.8	4.1	3.5	3.0	2.5	2.1	1.8	1.6	1.4	1.3	1.3	1.3	1.3
EXHAUST PRESSURE LOSS, in. H2O (Total)	24.7	21.3	18.5	15.8	13.4	11.3	9.4	8.4	7.5	6.7	6.3	5.5	4.8
EXHAUST PRESSURE LOSS, in. H2O (Static)	21.1	18.2	15.8	13.5	11.5	9.6	8.0	7.2	6.4	5.7	5.4	4.7	4.1
INJECTION FLUID	---	---	---	---	---	---	---	---	---	---	---	---	---
INJECTION RATIO	---	---	---	---	---	---	---	---	---	---	---	---	---
GAS TURBINE PERFORMANCE:													
GTG NET POWER OUTPUT, kW	206263	185536	164792	144024	123242	102443	81719	71295	60868	50440	40008	19138	0
GTG NET HEAT RATE, Btu/kWh (LHV)	9005	9154	9435	9755	10205	10886	12096	12947	14035	15384	17253	27402	--
GTG NET HEAT RATE, Btu/kWh (HHV)	9998	10163	10475	10830	11330	12086	13430	14374	15581	17080	19155	30422	--
FUEL FLOW, lbm/hr	88140	80595	73778	66669	59683	52918	46906	43799	40537	36822	32755	24884	17656
INJECTION RATE, lbm/hr	---	---	---	---	---	---	---	---	---	---	---	---	---
HEAT INPUT, mmBtu/hr (LHV)	1857	1698	1555	1405	1258	1115	988	923	854	776	690	524	372
HEAT INPUT, mmBtu/hr (HHV)	2062	1886	1726	1560	1396	1238	1097	1025	948	861	766	582	413
EXHAUST TEMPERATURE, °F	1076	1076	1076	1076	1076	1076	1077	1076	1076	1065	989	832	681
EXHAUST FLOW, lbm/hr	4164447	3853565	3582711	3302254	3030561	2775450	2528844	2402211	2270114	2150533	2146565	2138670	2131397
EXHAUST GAS COMPOSITION (% BY VOLUME):													
OXYGEN	12.72	12.81	12.94	13.09	13.28	13.51	13.73	13.90	14.08	14.35	15.05	16.45	17.76
CARBON DIOXIDE	3.74	3.69	3.64	3.57	3.48	3.37	3.27	3.20	3.11	2.99	2.67	2.03	1.44
WATER	7.82	7.74	7.63	7.49	7.32	7.11	6.91	6.76	6.60	6.35	5.72	4.46	3.28
NITROGEN	74.85	74.88	74.92	74.98	75.04	75.13	75.20	75.26	75.33	75.42	75.67	76.16	76.62
ARGON	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.89	0.89	0.90
MOLECULAR WEIGHT	28.44	28.45	28.45	28.46	28.47	28.49	28.50	28.51	28.52	28.53	28.57	28.65	28.73
NET EMISSIONS: Based on 21T5620 test methods													
NOx, ppmvd @ 15% O2	9	9	9	9	9	9	15	45	45	45	45	50	30
NOx, lbm/hr as NO2	69	63	58	52	47	42	61	170	157	142	126	105	44
CO, ppmvd @ 15% O2	4	4	4	4	4	15	10	650	1200	1200	1200	2000	2800
CO, lbm/hr	19	17	16	14	13	42	25	1496	2541	2307	2050	2564	2489
SO2, lbm/hr	3.0	2.8	2.5	2.3	2.1	1.8	1.6	1.5	1.4	1.3	1.2	0.9	0.6
VOC, ppmvd @ 15% O2 as CH4	1.0	1.0	1.0	1.0	5.0	5.0	75.0	80.0	80.0	80.0	80.0	100.0	300.0
VOC, lbm/hr as CH4	2.7	2.4	2.2	2.0	9.1	8.0	106.4	105.2	96.8	87.9	78.1	73.3	152.4
PARTICULATES, lbm/hr	8.7	8.1	8.0	8.0	8.0	8.0	10.7	10.2	9.6	9.1	9.2	9.2	9.3
OPACITY	<= 10%	<= 10%	<= 10%	<= 10%	<= 10%	<= 10%	<= 10%	<= 10%	<= 10%	<= 10%	<= 10%	<= 10%	<= 10%

NOTES:

- Performance is based on new and clean condition.
- All data is estimated and not guaranteed.
- Data included in any permit application or Environmental Impact Statement are strictly the responsibility of the Owner.
- SIEMENS is available to review permit application data upon request.
- GTG Net power output is at the generator terminals minus excitation losses. It does not include econopac auxiliary load losses.
- Estimated GT Performance values are dependent upon receiving test tolerances equal to measurement uncertainty calculated in accordance with ASME PTC 19.1-1998.
- Emission flowrates are calculated based on the maximum achievable exhaust flow. For further details on flowrate calculation contact SIEMENS.
- VOC's consist of total unburned hydrocarbons excluding methane and ethane. The concentration is expressed in terms of methane.
- Gas fuel composition [mole] is 97.9594% CH4, 1.149% C2H6, 0.0113% iC4H10, 0.017 nC4H10, 0.00228% iC5H12, 0.00228% nC5H12, 0.00382% C6H14, 0.3876% N2, 0.4673% CO2 and 0.5 grains of sulfur per 100 SCF.
- Gas fuel must be in compliance with the SIEMENS Gas Fuel Spec (21T0306 Rev.11).
- Particulates are per US EPA Method 5/202 (front and back half).
- Average temperature of the gas fuel is 410°F. Sensible heat of the fuel is not included in the fuel heating values.
- IGV schedule may be adjusted during commissioning. Part load performance will be adjusted accordingly.

Table 8.1B.3 Commissioning Turbine Analysis

Vernon Power Project - Commissioning Analyses

Updated 6/3/06

Given: New Start data from Siemens, dated 1/31/06, reference conversation and direction from K Nand, 2/2/06

Assume:

There will be no SCR control efficiency until ammonia is flowing

Assume that SCR will operate at Siemen's predicted emission rates during the phases where it is being tuned

35F Operating Scenarios to be applied to Commissioning Phases and Modeling

Turbine Load ¹	Fuel Flow			Catalyst Efficiencies		Emission Rates					Stack			
	mmBtu/hr	lbm/hr	10 ⁶ ft ³ /hr	CO	SCR	lb/hr NOx	lb/hr CO	lb/hr ² VOC	lb/hr ³ SO2	lb/hr PM10	Temp ⁴	lbm/hr	MW	ACFM
0-FSNL		9459	0.2186	unsp	unsp	24	754.29	81.43	0.13	5.57	187			
FSNL	413	17656	0.4081	89	0	43.8	273.7	121.9	0.24	9.3	187	2131397	28.73	583141
10%	582	24884	0.5752	89	0	105.3	282.0	58.6	0.35	9.2	187	2138670	28.65	586665
20%	766	32755	0.7572	89	0	126.3	225.5	62.5	0.45	9.2	187	2146565	28.57	590490
25%	861	36822	0.8512	89	0	142.1	253.8	70.3	0.51	9.1	187	2150533	28.53	592411
30%	948	40537	0.9371	89	0	156.5	279.5	77.4	0.56	9.6	187	2270114	28.52	625698
35%	1025	43799	1.0125	89	0	170.2	164.6	84.2	0.61	10.2	187	2402211	28.51	662349
40%	1097	46906	1.0843	89	0	61.2	2.7	85.1	0.65	10.7	187	2528844	28.50	697500
50%	1238	52918	1.2233	89	0	41.6	4.6	8.0	0.73	8.0	187	2775450	28.49	765854
50%	1238	52918	1.2233	89	oper ⁵	18.5	4.6	8.0	0.73	8.0	187	2775450	28.49	765854
70%	1560	66669	1.5411	89	0	52.4	1.6	2.0	0.92	8.0	189	3302254	28.46	914820
70%	1560	66669	1.5411	89	oper ⁵	23.3	1.6	2.0	0.92	8.0	189	3302254	28.46	914820
70%	1560	66669	1.5411	BACT	BACT	11.6	7.1	2.0	0.92	8.0	189	3302254	28.46	914820
Pre Source Test														
100%	2062	88140	2.0375	89	0	69.3	2.06	2.68	1.22	8.7	202	4164447	28.44	1177669
100%	2062	88140	2.0375	89	oper ⁵	30.8	2.06	2.68	1.22	8.7	202	4164447	28.44	1177669
100+DB ⁸	2200	94026	2.1735	89	oper ⁵	7.3	10.00	5.80	1.30	11.9	197	3986734.9	28.28	1125241
Post Source Test														
100%	2062	88140	2.0375	BACT ⁶	BACT	14.6	8.9	2.7	1.14	10.0	202	4164447	28.44	1177669
100+DB ⁹	2200	94026	2.1735	BACT	BACT	16.5	10.0	5.8	1.30	11.9	197	3,986,735	28.28	1125241

¹ NOx, CO, PM10, and VOC emissions, heat input, mass emissions, and megawatt production from Table 8.1A1-2

² Oxidation catalyst assumed to reduce VOC by 20 percent at load rates above 50%.

³ Calculated using SCAQMD AER of 0.6 lb SO₂/MMSCF of gas fired.

⁴ Stack temperatures from Siemens estimated Stack Tip Temperatures.

⁵ Oper assumes twice the BACT level of 2 ppm NOx outlet concentration

⁶ BACT means control systems are operating at BACT levels of efficiency

⁷ No NOx control assumed through day 1 through 51, 50% NOx control to 4 ppm for days 52 through 61, and BACT from day 62

⁸ 100% load and Duct Burner emissions are based on 65F 100% + DB scenario

Table 8.1B.4 Commissioning Turbine Scenarios and Emission Calculations

Vernon Power Project - Commissioning Analyses
Updated 6/3/06

Refer to Table 8.1B.1 for duration of each scenario and Table 8.1B.2 for fuel flow, efficiency, and emission rates, and Table 8.1B.3 for exhaust temperatures.

CTG Testing (Full Speed No Load, FSNL)

Duration 8 hours each turbine

Oxidation catalyst in place

Turbine Load	Duration hrs	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack			
		mmBtu/hr	lbm/hr	10 ⁶ ft ³ /hr	CO	SCR	lb/hr NOx	lb/hr CO	lb/hr VOC	lb/hr SO2	lb/hr PM10	lbm NOx	lbm CO	lbm VOC	lbm SO2	lbm PM10	Temp	lbm/hr	MW	ACFM
0-FSNL	0.23		9459	0.219	unsp	unsp	24	754	81.4	0.13	5.6	5.6	176	19	0.031	1.3	187	2131397	29	583141
FSNL	7.77	413	17656	0.41	89	0	43.8	274	122	0.2	9.3	340	2126	947	1.9	72.0	187	2131397	28.73	583141

Total Fuel Used (10⁶ ft³)

3.221

Emission Factor

(lbm/10⁶ ft³)

345.8 2302.1 965.7 1.93 73.35
107.4 714.7 299.8 0.6 22.8

CTG Testing @ 40% Load

Duration 8 hours each turbine

Oxidation Catalyst in place

Full Load 40% Use 40%

FSNL 2 minutes

Ramping at 3 mw/min 27.47 Minutes

Ramping Load 25%

Turbine Load	Duration hrs	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack			
		mmBtu/hr	lbm/hr	10 ⁶ ft ³ /hr	CO	SCR	lb/hr NOx	lb/hr CO	lb/hr VOC	lb/hr SO2	lb/hr PM10	lbm NOx	lbm CO	lbm VOC	lbm SO2	lbm PM10	Temp	lbm/hr	MW	ACFM
0-FSNL	0.23		9459	0.219	unsp	unsp	24	754	81.4	0.13	5.6	5.6	176	19	0.031	1.3	187	2131397	28.73	583141
FSNL	0.03	413	17656	0.41	89	0	43.8	274	122	0.2	9.3	1.5	9.1	4.1	0.0	0.3	187	2131397	28.73	583141
25%	0.46	861	36822	0.85	89	0	142	254	70.3	0.5	9.1	65.1	116	32.2	0.2	4.2	187	2150533	28.53	592411
40%	7.28	1097	46906	1.08	89	0	61.2	2.7	85	0.7	10.7	445	19.9	619	4.7	78	187	2528844	28.50	697500

Total Emissions (lbm)

517 321 675 5 83

Total Fuel Used (10⁶ ft³)

8.34

Emission Factor

(lbm/10⁶ ft³)

62.01 38.50 80.87 0.60 10.01

Extended Bypass Blowdown to Condenser/HRSG Tuning

Duration 12 hours per day

Oxidation Catalyst in place

Full Load 25% Use 25%

FSNL 2 minutes

Ramping at 3 MW/min 17.17 Minutes

Ramping Load 10%

Turbine Load	Duration hrs	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack			
		mmBtu/hr	lbm/hr	10 ⁶ ft ³ /hr	CO	SCR	lb/hr NOx	lb/hr CO	lb/hr VOC	lb/hr SO2	lb/hr PM10	lbm NOx	lbm CO	lbm VOC	lbm SO2	lbm PM10	Temp	lbm/hr	MW	ACFM
0-FSNL	0.23		9459	0.219	unsp	unsp	24	754	81.43	0.131	5.6	5.6	176	19	0.031	1.3	187	2131397	28.73	583141
FSNL	0.03	413	17656	0.41	89	0	43.8	274	122	0.2	9.3	1.5	9.1	4.1	0.01	0.3	187	2131397	28.73	583141
10%	0.29	582	24884	0.58	89	0	105	282	58.6	0.3	9.2	30.1	80.7	16.8	0.1	2.6	187	2138670	28.65	586665
25%	11.45	861	36822	0.85	89	0	142	254	70.3	0.5	9.1	1627	2905	805	5.8	104	187	2150533	28.53	592411

Per Day

1664.23 3170.91 844.70 5.98 108.70

Total Fuel Used (10⁶ ft³)

9.973

Emission Factor

(lbm/10⁶ ft³)

3328.46 6341.82 1689.41 11.97 217.40

166.88 317.95 84.70 0.60 10.90

Table 8.1B.4 Commissioning Turbine Scenarios and Emission Calculations

Extended Bypass Blowdown to Condenser

Duration 12 hours per day
 Oxidation Catalyst in place
 Full Load 50%
 FSNL 2 minutes
 Ramping at 3 MW/min 34.33 Minutes
 Ramping Load 25%

Turbine Load	Duration	hrs	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack		MW	ACFM
			mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr		
0-FSNL		0.23		9459	0.219	unsp	unsp	24	754	81.43	0.131	5.6	5.6	176	19	0.031	1.3	187	2131397	28.73	583141
FSNL		0.03	413	17656	0.41	89	0	43.8	274	122	0.2	9.3	1.5	9.1	4.1	0.01	0.3	187	2131397	28.73	583141
25%		0.57	861	36822	0.85	89	0	142	254	70.3	0.5	9.1	81.3	145	40.2	0.3	5.2	187	2150533	28.53	592411
50%		11.16	1238	52918	1.22	89	0	41.6	4.6	8.0	0.7	8.0	464	51.8	89.6	8.2	89	187	2775450	28.49	765854

Per Day 552.25 382.11 152.93 8.52 96.12
 Two Days
 Total Fuel Used (10^6 ft3) 14.205
 Emission Factor 38.88 26.90 10.77 0.60 6.77
 (lbm/10^6 ft3)

**Establish Vacuum, HRSG Tuning, BOP Tuning
 Establish Vacuum, BOP Tuning
 CTG Load Test & Bypass Valve Tuning**

Duration 16 hours per day
 Oxidation Catalyst in place
 Full Load 50% Use 50%
 FSNL 2 minutes
 Ramping at 3 MW/min 34.33 Minutes
 Ramping Load 25%

Turbine Load	Duration	hrs	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack		MW	ACFM
			mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr		
0-FSNL		0.23		9459	0.22	unsp	unsp	24	754	81	0.1	5.6	5.6	176	19	0.03	1.3	187	2131397	28.73	583141
FSNL		0.03	413	17656	0.41	89	0	44	274	122	0.2	9.3	1.5	63.9	28.4	0.1	2.2	187	2131397	28.73	583141
25%		0.57	861	36822	0.85	89	0	142	254	70	0.5	9.1	81.3	59.2	16.4	0.1	2.1	187	2150533	28.53	592411
50%		15.16	1238	52918	1.22	89	0	42	5	8	0.7	8.0	630.1	70.3	121.8	11.1	121.3	187	2775450	28.49	765854

Per Day 718.49 369.40 185.60 11.33 126.88
 Three Days
 Total Fuel Used (10^6 ft3) 19.098
 Emission Factor 37.62 19.34 9.72 0.59 6.64
 (lbm/10^6 ft3) 158.80

Table 8.1B.4 Commissioning Turbine Scenarios and Emission Calculations

CTG Load Test & Bypass Valve Tuning, Live Safety Valve Testing

Duration 12 hours per day
 Oxidation Catalyst in place
 Full Load 75% Use 70%

FSNL 2 minutes
 Ramping at 3 MW/min 51.5 Minutes
 Ramping Load 25% 25.8 Minutes
 50% 25.8 Minutes

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack	MW	ACFM		
		hrs	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm			Temp	lbm/hr
								NOx	CO	VOC	SO2	PM10	NOx	CO	VOC	SO2	PM10				
0-FSNL	0.23			9459	0.219	unsp	unsp	24	754	81	0.1	6	5.6	176.0	19.0	0.0	1.3	187	2131397	28.73	583141
FSNL	0.03		413	17656	0.408	89	0	44	274	122	0.2	9	1.5	9.1	4.1	0.0	0.3	187	2131397	28.73	583141
25%	0.43		861	36822	0.851	89	0	142	254	70	0.5	9	61.0	108.9	30.2	0.2	3.9	187	2150533	28.53	592411
50%	0.43		1238	52918	1.223	89	0	42	5	8	0.7	8	17.8	2.0	3.4	0.3	3.4	187	2775450	28.49	765854
70%	10.88		1560	66669	1.54	89	0	52.4	1.6	2.0	0.9	8.0	570	17	22	10	87	189	3302254	28.46	914820

Per Day
 Total Fuel Used (10^6 ft3) 17.715
 Emission Factor (lbm/10^6 ft3)
 655.54 312.98 78.70 10.63 95.96
 37.01 17.67 4.44 0.60 5.42

CTG Load Test & Bypass Valve Tuning (100%), CTG Baseload, Commissioning of Ammonia System

Duration 12 hours per day
 Oxidation Catalyst in place
 Full Load 100%

FSNL 2 minutes
 Ramping at 3 MW/min 68.67 Minutes
 Ramping Load 25% 34.33 Minutes
 70% 34.33 Minutes

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack	MW	ACFM		
		hrs	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm			Temp	lbm/hr
								NOx	CO	VOC	SO2	PM10	NOx	CO	VOC	SO2	PM10				
0-FSNL	0.23			9459	0.22	unsp	unsp	24	754.3	81.4	0.131	5.6	5.6	176	19	0.031	1.3	187	2131397	28.73	583141
FSNL	0.03		413	17656	0.41	89	0	44	274	122	0.2	9.3	1.5	9.1	4.1	0.01	0.3	187	2131397	28.73	583141
25%	0.57		861	36822	0.85	89	0	142	254	70	0.5	9.1	61.0	109	30.2	0.2	3.9	187	2150533	28.53	592411
70%	0.57		1560	66669	1.54	89	0	52.4	1.6	2.0	0.9	8.0	30.0	0.9	1.2	0.5	4.6	189	3302254	28.46	914820
100%	10.59		2062	88140	2.04	89	0	69.3	2.1	2.7	1.2	8.7	734	21.8	28.3	12.9	92	202	4164447	28.44	1177669

Per Day
 Total Fuel Used (10^6 ft3) 23.008
 Emission Factor (lbm/10^6 ft3)
 831.57 316.76 82.75 13.73 102.49
 36.14 13.77 3.60 0.60 4.45

Table 8.1B.4 Commissioning Turbine Scenarios and Emission Calculations

Bypass Operation, STG Initial Roll & Trip Test

Duration 10 hours per day
 Full Load 50%
 SCR assumed to be at 50% efficiency.
 FSNL 2 Minutes
 Oxidation Catalyst in place, ammonia now functioning
 Ramping at 3 MW/Min 34.33 Minutes
 Ramping Load 25%

Turbine Load	Duration hrs	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack			
		mmBtu/hr	lbm/hr	10 ⁶ ft ³ /hr	CO	SCR	lb/hr NOx	lb/hr CO	lb/hr VOC	lb/hr SO2	lb/hr PM10	lbm NOx	lbm CO	lbm VOC	lbm SO2	lbm PM10	Temp	lbm/hr	MW	ACFM
0-FSNL	0.23	0.00	9459	0.22	unsp	unsp	24.00	754.29	81.43	0.13	5.57	5.6	176.0	19.0	0.0	1.3	187	2131397	28.73	583141
FSNL	0.03	413.00	17656	0.41	89.00	0	43.80	273.75	121.89	0.24	9.28	1.5	9.1	4.1	0.0	0.3	187	2131397	28.73	583141
25%	0.57	861.00	36822	0.85	89.00	0	142.13	253.78	70.31	0.51	9.12	81.3	145.2	40.2	0.3	5.2	187	2150533	28.53	592411
50%	9.16	1238	52918	1.22	89	50	18.5	4.6	8.0	0.7	8.0	169.2	42.5	73.6	6.7	73.3	187	2775450	28.49	765854

Per Day
 Total Fuel Used (10⁶ ft³) 11.76
 Emission Factor (lbm/10⁶ ft³)
 257.61 372.83 136.87 7.05 80.12
 21.91 31.71 11.64 0.60 6.81

Bypass Operation, STG Load Test

Duration 16 hours per day
 Full Load 50%
 SCR assumed to be at 50% efficiency.
 FSNL 2 Minutes
 Oxidation Catalyst in place, ammonia now functioning
 Ramping at 3 MW/Min 34.33 Minutes
 Ramping Load 25%

Turbine Load	Duration hrs	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack			
		mmBtu/hr	lbm/hr	10 ⁶ ft ³ /hr	CO	SCR	lb/hr NOx	lb/hr CO	lb/hr VOC	lb/hr SO2	lb/hr PM10	lbm NOx	lbm CO	lbm VOC	lbm SO2	lbm PM10	Temp	lbm/hr	MW	ACFM
0-FSNL	0.23	0	9459	0.219	unsp	unsp	24	754	81.4	0.1	5.6	5.6	176	19	0.031	1.3	187	2131397	28.73	583141
FSNL	0.03	413	17656	0.41	89	0	43.8	274	122	0.2	9.3	1.5	9.1	4.1	0.01	0.3	187	2131397	28.73	583141
25%	0.57	861	36822	0.85	89	0	142	254	70.3	0.5	9.1	81.3	145.2	40.2	0.3	5.2	187	2150533	28.53	592411
50%	15.16	1238	52918	1.22	89	50	18.5	4.6	8.0	0.7	8.0	280	70.3	121.8	11.1	121	187	2775450	28.49	765854

Per Day
 Total Fuel Used (10⁶ ft³) 19.098
 Emission Factor (lbm/10⁶ ft³)
 368.43 400.66 185.05 11.46 128.12
 19.29 20.98 9.69 0.60 6.71

Table 8.1B.4 Commissioning Turbine Scenarios and Emission Calculations

CTG on Bypass, STG Load Test

Duration 16 hours per day
 Full Load 100%
 SCR assumed to be at 50% efficiency.
 FSNL 2 Minutes
 Oxidation Catalyst in place, ammonia now functioning
 Ramping at 3 MW/Min 68.67 Minutes
 Ramping Load 25% 34.33
 70% 34.33

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack				
		hrs	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr	MW	ACFM
								NOx	CO	VOC	SO2	PM10	NOx	CO	VOC	SO2	PM10				
0-FSNL	0.23			9459	0.219	unsp	unsp	24.0	754.3	81.4	0.1	5.6	5.6	176	19	0.03	1.3	187	2131397	28.73	583141
FSNL	0.03		413	17656	0.408	89	0	43.8	273.7	121.9	0.2	9.3	1.5	9.1	4.1	0.01	0.3	187	2131397	28.73	583141
25%	0.57		861	36822	0.851	89	0	142.1	253.8	70.3	0.5	9.1	81	145	40	0.3	5.2	187	2150533	28.53	592411
70%	0.57		1560	66669	1.541	89	50	23.3	1.6	2.0	0.9	8.0	13.3	0.9	1.2	0.5	4.6	189	3302254	28.46	914820
100%	14.59		2062	88140	2.037	89	50	30.8	2.1	2.7	1.2	8.7	449	30	39	18	127	202	4164447	28.44	1177669

Per Day
 Total Fuel Used (10^6 ft3) 31.16
 Emission Factor (lbm/10^6 ft3)
 550.89 361.31 103.51 18.69 138.70
 17.68 11.60 3.32 0.60 4.45

STG Load Test, Combined Cycle, Combined Cycle Testing, Commissioning Duct Burners

Duration 24 hours per day
 Assume that there is only one start on the first day operation - This is a continuous test

Full Load 100%
 SCR assumed to be at 50% efficiency.
 FSNL 2 minutes per start
 Ramping at 3 MW/minute 68.67 Minutes
 Ramping Loads 25% 34.33
 70% 34.33

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack				
		hrs	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr	MW	ACFM
								NOx	CO	VOC	SO2	PM10	NOx	CO	VOC	SO2	PM10				
0-FSNL	0.23			9459	0.219	unsp	unsp	24	754	81.4	0.13	5.57	5.6	176	19	0.03	1.3	187	2131397	28.73	583141
FSNL	0.03		413	17656	0.41	89	0	44	274	122	0.2	9.3	1.5	9.1	4.1	0.01	0.3	187	2131397	28.73	583141
25%	0.57		861	36822	0.85	89	0	142	254	70.3	0.5	9.1	81.3	145.2	40.2	0.3	5.2	187	2150533	28.53	592411
70%	0.57		1560	66669	1.54	89	50	23.3	1.6	2.0	0.9	8.0	13.3	0.9	1.2	0.5	4.6	189	3302254	28.46	914820
100%	22.59		2062	88140	2.04	89	50	30.8	2.1	2.7	1.2	8.7	695.5	46.6	60.5	27.6	197.1	202	4164447	28.44	1177669

Per Day
 Total Fuel Used (10^6 ft3) 47.46
 Emission Factor (lbm/10^6 ft3)
 797.19 377.80 124.93 28.47 208.49
 16.80 7.96 2.63 0.60 4.39

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack				
		hrs	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr	MW	ACFM
								NOx	CO	VOC	SO2	PM10	NOx	CO	VOC	SO2	PM10				
100%+DB	24		2200	94026	2	89	50	7.3	10.0	5.8	1.3	11.9	176.00	240.00	139.20	31.30	285.60	197	3986735	28.28	1125241

Total Fuel Used (10^6 ft3) 52.164503
 Emission Factor (lbm/10^6 ft3)
 3.37 4.60 2.67 0.60 5.47

Table 8.1B.4 Commissioning Turbine Scenarios and Emission Calculations

Emissions Tuning

Duration 12 hours per day
 Full Load 100%
 SCR assumed to be at 50% efficiency.
 FSNL 2 minutes per start
 Ramping at 3 MW/minute 68.67 Minutes
 Ramping Loads
 25% 34.33
 70% 34.33

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack				
		hrs	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr	MW	ACFM
0-FSNL	0.23			9459	0.219	unsp	unsp	24	754	81.4	0.1	5.6	5.6	176	19	0.031	1.3	187	2131397	28.73	583141
FSNL	0.03		413	17656	0.41	89	0	43.8	274	122	0.2	9.3	1.5	9.1	4.1	0.01	0.3	187	2131397	28.73	583141
25%	0.57		861	36822	0.85	89	0	142	254	70.3	0.5	9.1	81.3	145	40.2	0.3	5.2	187	2150533	28.53	592411
70%	0.57		1560	66669	1.54	89	50	23.3	1.6	2.0	0.9	8.0	13.3	0.9	1.16	0.5	4.6	189	3302254	28.46	914820
100%	10.59		2062	88140	2.04	89	50	30.8	2.1	2.7	1.2	8.7	326	21.8	28.3	12.9	92	202	4164447	28.44	1177669

Per Day
 Total Fuel Used (10^6 ft3) 23.01
 Emission Factor (lbm/10^6 ft3)
 427.73 353.07 92.80 13.80 103.80
 18.59 15.35 4.03 0.60 4.51

RATA, Pre-perform Testing, Source Testing, Drift Testing

Duration 12 hours per day
 Full Load 100%+DB
 Note: There is no Duct Burner scenario at 35F - Use 65F Duct Burner data
 SCR assumed to be at full efficiency.
 FSNL 2 minutes per start
 Ramping at 3 MW/minute 68.67 Minutes
 Ramping Loads
 25% 34.33
 70% 34.33

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack				
		hrs	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr	MW	ACFM
0-FSNL	0.2333333			9459	0.219	unsp	unsp	24	754	81.4	0.13	5.6	5.6	176	19	0.031	1.3	187	2131397	28.73	583141
FSNL	0.03		413	17656	0.41	89	0	43.8	274	122	0.2	9.3	1.5	9.1	4.1	0.01	0.3	187	2131397	28.73	583141
25%	0.57		861	36822	0.85	89	0	142	254	70.3	0.5	9.1	81.3	145.2	40.2	0.29	5.2	187	2150533	28.53	592411
70%	0.57		1560	66669	1.54	BACT	BACT	11.6	7.1	2.0	0.9	8.0	6.7	0.9	1.2	0.5	4.6	189	3302254	28.46	914820
100%+DB	10.59		2200	94026	2.2	BACT	BACT	16.5	10.0	5.8	1.30	11.9	175	106	61.4	13.8	126	197	3986735	28	1125241

Per Day
 Total Fuel Used (10^6 ft3) 24.45
 Emission Factor (lbm/10^6 ft3)
 269.77 437.13 125.87 14.67 137.42
 11.03 17.88 5.15 0.60 5.62

Table 8.1B.4 Commissioning Turbine Scenarios and Emission Calculations

CALISO CERTIFICATION TESTING

Duration 12 hours per day
 Full Load 100%
 Note: Controls are operating at full BACT levels at 100% load
 Emission controls at BACT at steady state operation.

SCR assumed to be at full efficiency.
 FSNL 2 minutes per start
 Ramping at 3 MW/minute 68.67 Minutes
 Ramping Loads
 25% 34.33
 70% 34.33

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack		MW	ACFM
		hrs	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp		
0-FSNL	0.23	0	9459	0.219	unsp	unsp	24	754	81.4	0.13	5.6	5.6	176	19	0.031	1.3	187	2131397	28.73	583141
FSNL	0.03	413	17656	0.41	89	0	43.8	274	122	0.2	9.3	1.5	9.1	4.1	0.01	0.3	187	2131397	28.73	583141
25%	0.57	861	36822	0.85	89	0	142	254	70.3	0.5	9.1	81.3	145	40.2	0.3	5.2	187	2150533	28.53	592411
70%	0.57	1560	66669	1.54	BACT	BACT	11.6	7.1	2.0	0.9	8.0	6.7	4.1	1.2	0.5	4.6	189	3302254	28.46	914820
100%	10.59	2062	88140	2	BACT	BACT	14.6	8.9	2.7	1.14	10.0	155	94	28.6	12.1	106	202	4164447	28	1177669

Per Day
 Total Fuel Used (10^6 ft3) 23.01
 Emission Factor (lbm/10^6 ft3)
 10.85 18.63 4.04 0.56 5.10

Performance Testing

Duration 24 hours per day
 Full Load 100% Day 1
 100%+DB Day 2
 Assume continuous operation with Duct burner firing in second day
 Note: There is no Duct Burner scenario at 35F - Use 65F Duct Burner data
 Emission controls at BACT at steady state operation.

#REF!
 FSNL 2 minutes per start
 Ramping at 3 MW/minute 68.67 Minutes
 Ramping Loads
 25% 34.33
 70% 34.33

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack		MW	ACFM
		hrs	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp		
0-FSNL	0.23	0	9459	0.22	unsp	unsp	24.0	754	81.4	0.13	5.57	5.6	176	19	0.03	1.3	187	2131397	28.73	583141
FSNL	0.03	413	17656	0.41	89.00	0.00	43.8	274	122	0.24	9.28	1.46	9.12	4.06	0.01	0.31	187	2131397	28.73	583141
25%	0.57	861	36822	0.85	89.00	0.00	142	254	70.3	0.51	9.12	81.3	145.2	40.2	0.3	5.2	187	2150533	28.53	592411
70%	0.57	1560	66669	1.54	BACT	BACT	11.6	7.09	2.0	0.92	8.00	6.7	4.1	1.2	0.5	4.6	189	3302254	28.46	914820
100%	22.59	2062	88140	2.04	BACT	BACT	14.6	8.9	2.7	1.1	10	330	201	61	26	226	202	4164447	28.44	1177669

Per Day-Day 1
 Total Fuel Used (10^6 ft3) 47.46
 Emission Factor (lbm/10^6 ft3)
 8.95 11.28 2.64 0.56 5.00

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack		MW	ACFM
		hrs	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp		
Day 2							NOx	CO	VOC	SO2	PM10	NOx	CO	VOC	SO2	PM10				
100%+DB	24	2200	94026	2	BACT	BACT	16.5	10.0	5.8	1.30	11.9	396	240	139	31.3	286	197	3986735	28.28	1125241

Total Fuel Used (10^6 ft3) 52.16
 Emission Factor (lbm/10^6 ft3)
 7.59 4.60 2.67 0.60 5.47

Table 8.1B.4 Commissioning Turbine Scenarios and Emission Calculations

Cal ISO Certification

Duration 12 hours per day
 Full Load 100% Day 1

Note:
 Controls are operating at full BACT levels at 100% load
 Emission controls at BACT at steady state operation.

FSNL 2 minutes per start
 Ramping at 3 MW/minute 68.67 Minutes
 Ramping Loads
 25% 34.33
 70% 34.33

Turbine Load	Duration	hrs	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack		MW	ACFM	
			mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr			
0-FSNL	0	0.23	0	9459	0.219	unsp	unsp	24	754.3	81.4	0.131	5.571	5.6	176	19	0.031	1.3	187	2131397	28.73	583141	
FSNL		0.03		413	17656	0.41	89	0	43.8	274	122	0.2	9.3	1.5	9.1	4.1	0.01	0.3	187	2131397	28.73	583141
25%		0.57		861	36822	0.85	89	0	142	254	70.3	0.5	9.1	81.3	145	40.2	0.3	5.2	187	2150533	28.53	592411
70%		0.57		1560	66669	1.54	BACT	BACT	11.6	7.1	2.0	0.9	8	6.7	4.1	1.2	0.5	4.6	189	3302254	28.46	914820
100%		10.59		2062	88140	2.04	BACT	BACT	14.6	8.9	2.7	1.1	10	155	94.2	28.6	12.1	106	202	4164447	28.44	1177669

Per Day 23.01 249.65 428.64 93.05 12.93 117.30
 Total Fuel Used (10^6 ft3)
 Emission Factor (lbm/10^6 ft3) 10.85 18.63 4.04 0.56 5.10

Cal ISO Certification with Duct Burner

Duration 12 hours per day
 Full Load 100%+DB Day 2

Note:
 Siemens schedule does not show the DB operating, but operating title implies it is running

Controls are operating at full BACT levels at 100% load

0
 FSNL 10 minutes per start
 Ramping at 3 MW/minute 68.67 Minutes
 Ramping Loads
 25% 34.33
 70% 34.33

Turbine Load	Duration	hrs	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack		MW	ACFM	
			mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr			
0-FSNL	0	0.23	0	9459	0.219	unsp	unsp	24.0	754	81.4	0.1	5.6	5.6	176	19	0.03	1.3	187	2131397	28.73	583141	
FSNL		0.03		413	17656	0.408	89	0	43.8	274	122	0.2	9.3	1.5	9.1	4.1	0.01	0.3	187	2131397	28.73	583141
25%		0.57		861	36822	0.851	89	0	142	254	70.3	0.5	9.1	81.3	145.2	40.2	0.29	5.2	187	2150533	28.53	592411
70%		0.57		1560	66669	1.541	BACT	BACT	11.6	7.1	2.0	0.9	8.0	6.7	4.1	1.2	0.5	4.6	189	3302254	28.46	914820
100%+DB		10.59		2200	94026	2.17	BACT	BACT	16.5	10.0	5.8	1.30	11.9	175	106	61	14	126	197	3986735	28.28	1125241

Per Day 5.19 269.77 440.29 125.87 14.67 137.42
 Total Fuel Used (10^6 ft3)
 Emission Factor (lbm/10^6 ft3) 51.95 84.79 24.24 2.83 26.46



City of Vernon

Based on USAacb_v_Arev6

**Estimated SGT6-5000F Gas Turbine Performance
Combined Cycle / Dry Low NOx Combustor
SGen6-1000A / 0.90 Power Factor**

May 8, 2006

SITE CONDITIONS:	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6
	Natural Gas					
FUEL TYPE	Natural Gas					
LOAD LEVEL	BASE	90%	80%	70%	60%	50%
NET FUEL HEATING VALUE, Btu/lbm (LHV)	21,074	21,074	21,074	21,074	21,074	21,074
GROSS FUEL HEATING VALUE, Btu/lbm (HHV)	23,397	23,397	23,397	23,397	23,397	23,397
EVAPORATIVE COOLER STATUS/EFFECTIVENESS	OFF	OFF	OFF	OFF	OFF	OFF
AMBIENT DRY BULB TEMPERATURE, °F	35.0	35.0	35.0	35.0	35.0	35.0
AMBIENT WET BULB TEMPERATURE, °F	32.2	32.2	32.2	32.2	32.2	32.2
AMBIENT RELATIVE HUMIDITY, %	75%	75%	75%	75%	75%	75%
BAROMETRIC PRESSURE, psia	14.6	14.6	14.6	14.6	14.6	14.6
COMPRESSOR INLET TEMPERATURE, °F	35.0	35.0	35.0	35.0	35.0	35.0
INLET PRESSURE LOSS, in. H2O (Total)	4.8	4.1	3.5	3.0	2.5	2.1
EXHAUST PRESSURE LOSS, in. H2O (Total)	24.7	21.3	18.5	15.8	13.4	11.3
EXHAUST PRESSURE LOSS, in. H2O (Static)	21.1	18.2	15.8	13.5	11.5	9.6

GAS TURBINE PERFORMANCE:	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6
FUEL FLOW, lbm/hr	88,140	80,595	73,778	66,669	59,683	52,918
HEAT INPUT, mmBtu/hr (LHV)	1,857	1,698	1,555	1,405	1,258	1,115
HEAT INPUT, mmBtu/hr (HHV)	2,062	1,886	1,726	1,560	1,396	1,238
EXHAUST TEMPERATURE, °F	1,076	1,076	1,076	1,076	1,076	1,076
EXHAUST FLOW, lbm/hr	4,164,447	3,853,565	3,582,711	3,302,254	3,030,561	2,775,450

EXHAUST GAS COMPOSITION (% BY VOLUME):	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6
OXYGEN	12.72	12.82	12.94	13.09	13.28	13.51
CARBON DIOXIDE	3.73	3.69	3.64	3.57	3.48	3.37
WATER	7.82	7.73	7.62	7.49	7.32	7.11
NITROGEN	74.85	74.88	74.92	74.98	75.04	75.13
ARGON	0.88	0.88	0.88	0.88	0.88	0.88
MOLECULAR WEIGHT	28.44	28.45	28.45	28.46	28.47	28.49

GAS TURBINE EMISSIONS: Based on USEPA or Equivalent SCAQMD Test Methods	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6
NO _x , ppmvd @ 15% O ₂	9	9	9	9	9	9
NO _x , lb _m /hr as NO ₂	69.3	63.3	58.0	52.4	46.9	41.6
CO, ppmvd @ 15% O ₂	4	4	4	4	10	15
CO, lb _m /hr	18.7	17.1	15.7	14.2	31.7	42.2
SO ₂ , lb _m /hr	2.2	2.0	1.8	1.7	1.5	1.3
VOC, ppmvd @ 15% O ₂ as CH ₄	1	1	1	1	5	5
VOC, lb _m /hr as CH ₄	2.7	2.4	2.2	2.0	9.1	8.0
PARTICULATES, lb _m /hr	8.5	8.1	8.0	8.0	8.0	8.0
OPACITY, %	10	10	10	10	10	10

STACK EMISSIONS: Based on USEPA or Equivalent SCAQMD Test Methods	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6
NO _x , ppmvd @ 15% O ₂	2	2	2	2	2	2
NO _x , lb _m /hr as NO ₂	15.4	14.1	12.9	11.7	10.5	9.3
NH ₃ (Ammonia) Slip, ppmvd @ 15% O ₂	5	5	5	5	5	5
CO, ppmvd @ 15% O ₂	2	2	2	2	2	3
CO, lb _m /hr	9.4	8.6	7.9	7.1	6.4	8.5
SO ₂ , lb _m /hr	2.2	2.0	1.8	1.7	1.5	1.3
VOC, ppmvd @ 15% O ₂ as CH ₄	1	1	1	1	2	2
VOC, lb _m /hr as CH ₄	2.7	2.5	2.3	2.1	3.7	3.3
PARTICULATES, lb _m /hr	9.8	9.1	8.4	8.0	8.0	8.0
OPACITY, %	10	10	10	10	10	10

NOTES:

- Performance is based on new and clean condition.
- All data is estimated and not guaranteed.
- VOC consist of total hydrocarbons excluding methane and ethane and are expressed in terms of methane (CH₄).
- Gas fuel composition (% by volume unless otherwise noted) is: 97.9594 CH₄, 1.149 C₂H₆, 0.0113 iC₄H₁₀, 0.017 nC₄H₁₀, 0.00228 iC₅H₁₂, 0.00228 nC₅H₁₂, 0.00382 C₆H₁₄, 0.3876 N₂, 0.4673% CO₂ and 0.35 gr S/100 scf.
- Gas fuel must be in compliance with the SIEMENS Gas Fuel Spec (21T0306 Rev.11).
- Particulates are per US EPA Method 5/202 (front and back half) or equivalent South Coast Air Quality Management District (SCAQMD) test method.
- Stack emissions assume an SCR and oxidation catalyst.
- Average temperature of the gas fuel is 410 °F. Sensible heat of the fuel is not included in the fuel heating values.
- Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement are strictly the customer's responsibility.

Table 8.1B.5b Siemens Performance Data for 35 F Ambient Conditions (10% Loads)



City of Vernon
Estimated SGT6-5000F Gas Turbine Performance
Combined Cycle / Dry Low NOx Combustor
SGen6-1000A / 0.90 Power Factor

Based on USAacb_Ar4b
 10/07/2005

SITE CONDITIONS:	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11
FUEL TYPE	Natural Gas										
LOAD LEVEL	BASE	90%	80%	70%	60%	50%	40%	30%	20%	10%	FSNL
NET FUEL HEATING VALUE, Btu/lbm (LHV)	21074	21074	21074	21074	21074	21074	21074	21074	21074	21074	21074
GROSS FUEL HEATING VALUE, Btu/lbm (HHV)	23397	23397	23397	23397	23397	23397	23397	23397	23397	23397	23397
EVAPORATIVE COOLER STATUS/EFFECTIVENESS	OFF										
AMBIENT DRY BULB TEMPERATURE, °F	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
AMBIENT WET BULB TEMPERATURE, °F	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2
AMBIENT RELATIVE HUMIDITY, %	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
BAROMETRIC PRESSURE, psia	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600
COMPRESSOR INLET TEMPERATURE, °F	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
INLET PRESSURE LOSS, in. H2O (Total)	4.8	4.1	3.5	3.0	2.5	2.1	2.0	2.0	2.0	2.0	2.0
EXHAUST PRESSURE LOSS, in. H2O (Total)	24.7	21.3	18.5	15.8	13.4	11.3	9.9	9.1	8.3	7.5	6.8
EXHAUST PRESSURE LOSS, in. H2O (Static)	21.1	18.2	15.8	13.5	11.5	9.6	8.5	7.8	7.1	6.4	5.8
INJECTION FLUID	---	---	---	---	---	---	---	---	---	---	---
INJECTION RATIO	---	---	---	---	---	---	---	---	---	---	---
GAS TURBINE PERFORMANCE:											
FUEL FLOW, lbm/hr	88126	80583	73767	66659	59673	53069	46666	39622	32200	25254	18782
INJECTION RATE, lbm/hr	---	---	---	---	---	---	---	---	---	---	---
HEAT INPUT, mmBtu/hr (LHV)	1857	1698	1555	1405	1258	1118	983	835	679	532	396
HEAT INPUT, mmBtu/hr (HHV)	2062	1885	1726	1560	1396	1242	1092	927	753	591	439
EXHAUST TEMPERATURE, °F	1076	1076	1076	1076	1076	1076	1076	1076	1076	1076	1076
EXHAUST FLOW, lbm/hr	4164433	3853571	3582691	3302256	3030569	2775463	2664142	2656753	2649556	2642476	2636004
EXHAUST GAS COMPOSITION (% BY VOLUME):											
OXYGEN	12.72	12.82	12.94	13.09	13.28	13.51	14.16	15.21	16.24	17.27	18.22
CARBON DIOXIDE	3.73	3.69	3.64	3.57	3.48	3.37	3.08	2.60	2.13	1.66	1.23
WATER	7.82	7.73	7.62	7.49	7.32	7.11	6.52	5.58	4.65	3.73	2.87
NITROGEN	74.85	74.88	74.92	74.98	75.04	75.13	75.35	75.72	76.09	76.45	76.78
ARGON	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.89	0.89	0.90	0.90
MOLECULAR WEIGHT	28.44	28.45	28.45	28.46	28.47	28.49	28.52	28.58	28.64	28.70	28.76
NET EMISSIONS: Based on USEPA test methods											
NOx, ppmvd @ 15% O2	9	9	9	9	9	15	45	45	45	50	30
NOx, lbm/hr as NO2	69.3	63.3	58.0	52.4	46.9	69.3	181	152	123	105	46
CO, ppmvd @ 15% O2	4	4	4	4	10	150	700	1800	1800	3000	4000
CO, lbm/hr	18.7	17.1	15.7	14.2	31.7	421.6	1718	3700	3000	3852	3734
SO2, lbm/hr	3.0	2.8	2.5	2.3	2.1	1.8	1.6	1.4	1.1	0.9	0.7
VOC, ppmvd @ 15% O2 as CH4	1	1	1	1	5	30	50	75	60	120	300
VOC, lbm/hr as CH4	2.7	2.4	2.2	2.0	9.1	48.2	70.1	88.1	57.1	88.0	160
PARTICULATES, lbm/hr	9	9	8	8	8	8	12	12	12	12	12
OPACITY, %	10	10	10	10	10	10	10	10	10	10	10

NOTES:

- Performance is based on new and clean condition.
- All data is estimated and not guaranteed.
- VOC's consist of total hydrocarbons excluding methane and ethane is expressed in terms of methane.
- Gas fuel composition [% vol] is 97.9594% CH4, 1.149% C2H6, 0.0113% iC4H10, 0.017 nC4H10, 0.00228% iC5H12, 0.00228% nC5H12, 0.00382% C6H14, 0.3876% N2, 0.4673% CO2, and 0.35 gr S/100 scf.
- Gas fuel must be in compliance with the SIEMENS Gas Fuel Spec (21T0306 Rev.11).
- Particulates are per US EPA Method 5/202 (front and back half).
- Average temperature of the gas fuel is 410°F. Sensible heat of the fuel is not included in the fuel heating values.
- Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement are strictly the customer's responsibility.

SIEMENS**City of Vernon**

Based on USAacb_Arev5_ab

**Estimated SGT6-5000F Gas Turbine Performance
Combined Cycle / Dry Low NOx Combustor
SGen6-1000A / 0.90 Power Factor**

May 8, 2006

SITE CONDITIONS:	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 9	CASE 9 + DB
FUEL TYPE	Natural Gas							
LOAD LEVEL	BASE	90%	80%	70%	60%	50%	BASE	BASE
NET FUEL HEATING VALUE, Btu/lbm (LHV)	21,074	21,074	21,074	21,074	21,074	21,074	21,074	21,074
GROSS FUEL HEATING VALUE, Btu/lbm (HHV)	23,397	23,397	23,397	23,397	23,397	23,397	23,397	23,397
EVAPORATIVE COOLER STATUS/EFFECTIVENESS	OFF	OFF	OFF	OFF	OFF	OFF	85%	85%
AMBIENT DRY BULB TEMPERATURE, °F	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
AMBIENT WET BULB TEMPERATURE, °F	56.6	56.6	56.6	56.6	56.6	56.6	56.6	56.6
AMBIENT RELATIVE HUMIDITY, %	60%	60%	60%	60%	60%	60%	60%	60%
BAROMETRIC PRESSURE, psia	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6
COMPRESSOR INLET TEMPERATURE, °F	65.0	65.0	65.0	65.0	65.0	65.0	57.9	57.9
INLET PRESSURE LOSS, in. H ₂ O (Total)	4.5	3.9	3.3	2.8	2.4	2.0	4.6	4.6
EXHAUST PRESSURE LOSS, in. H ₂ O (Total)	22.3	19.3	16.8	14.4	12.2	10.3	23.0	23.0
EXHAUST PRESSURE LOSS, in. H ₂ O (Static)	19.1	16.5	14.3	12.3	10.4	8.8	19.6	19.6
GAS TURBINE PERFORMANCE:								
FUEL FLOW, lbm/hr - GT Only	81,965	75,030	68,666	62,142	55,758	49,593	83,768	83,768
FUEL FLOW, lbm/hr - DB Only	0	0	0	0	0	0	0	6,786
HEAT INPUT, mmBtu/hr (LHV) - GT Only	1,727	1,581	1,447	1,310	1,175	1,045	1,765	1,765
HEAT INPUT, mmBtu/hr (HHV) - GT Only	1,918	1,755	1,607	1,454	1,305	1,160	1,960	1,960
HEAT INPUT, mmBtu/hr (LHV) - DB Only	0	0	0	0	0	0	0	132
HEAT INPUT, mmBtu/hr (HHV) - DB Only	0	0	0	0	0	0	0	147
EXHAUST TEMPERATURE, °F - GT	1,100	1,100	1,100	1,100	1,100	1,100	1,095	1,095
EXHAUST FLOW, lbm/hr - GT + DB	3,915,152	3,627,509	3,369,311	3,111,135	2,863,004	2,630,983	3,976,477	3,982,760
EXHAUST GAS (HRSG STACK) COMPOSITION (% BY VOLUME):								
OXYGEN	12.68	12.77	12.89	13.04	13.23	13.46	12.59	12.01
CARBON DIOXIDE	3.69	3.64	3.59	3.52	3.43	3.33	3.70	3.97
WATER	8.44	8.35	8.25	8.11	7.95	7.73	8.72	9.24
NITROGEN	74.33	74.36	74.40	74.45	74.52	74.60	74.12	73.92
ARGON	0.87	0.87	0.87	0.87	0.87	0.88	0.87	0.87
MOLECULAR WEIGHT	28.37	28.37	28.38	28.39	28.40	28.41	28.34	28.30
GAS TURBINE EMISSIONS: Based on USEPA or Equivalent SCAQMD Test Methods								
NO _x , ppmvd @ 15% O ₂	9	9	9	9	9	9	9	9
NO _x , lb _m /hr as NO ₂	64.4	59.0	54.0	48.8	43.8	38.9	65.8	65.8
CO, ppmvd @ 15% O ₂	4	4	4	4	10	15	4	4
CO, lb _m /hr	17.4	16.0	14.6	13.2	29.6	39.5	17.8	17.8
SO ₂ , lb _m /hr	2.0	1.8	1.7	1.5	1.3	1.2	2.9	2.9
VOC, ppmvd @ 15% O ₂ as CH ₄	1.0	1.0	1.0	1.0	5.0	5.0	1.0	1.0
VOC, lb _m /hr as CH ₄	2.5	2.3	2.1	1.9	8.5	7.5	2.5	2.5
PARTICULATES, lb _m /hr	9	8	8	8	8	8	8	8.0
OPACITY, %	10	10	10	10	10	10	10	10
STACK EMISSIONS: Based on USEPA or Equivalent SCAQMD Test Methods								
NO _x , ppmvd @ 15% O ₂	2	2	2	2	2	2	2	2
NO _x , lb _m /hr as NO ₂	14.4	13.1	12.0	10.9	9.8	8.7	14.7	15.8
NH ₃ (Ammonia) Slip, ppmvd @ 15% O ₂	5	5	5	5	5	5	5	5
CO, ppmvd @ 15% O ₂	2	2	2	2	2	3	2	2
CO, lb _m /hr	8.8	8.0	7.4	6.7	6.0	8.0	9.0	9.6
SO ₂ , lb _m /hr	2.0	1.9	1.7	1.6	1.4	1.3	2.1	2.2
VOC, ppmvd @ 15% O ₂ as CH ₄	1	1	1	1	2	2	1	2
VOC, lb _m /hr as CH ₄	2.5	2.3	2.1	1.9	3.4	3.1	2.6	5.5
PARTICULATES, lb _m /hr	9.2	8.5	8.0	8.0	8.0	8.0	9.3	10.9
OPACITY, %	10	10	10	10	10	10	10	10

NOTES:

- Performance is based on new and clean condition.
- All data is estimated and not guaranteed.
- VOC consist of total hydrocarbons excluding methane and ethane and are expressed in terms of methane (CH₄)
- Gas fuel composition (% by volume unless otherwise noted) is: 97.9594 CH₄, 1.149 C₂H₆, 0.0113 iC₄H₁₀, 0.017 nC₄H₁₀, 0.00228 iC₅H₁₂, 0.00228 nC₅H₁₂, 0.00382 C₆H₁₄, 0.3876 N₂, 0.4673% CO₂ and 0.35 gr S/100 scf.
- Gas fuel must be in compliance with the SIEMENS Gas Fuel Spec (21T0306 Rev.11).
- Particulates are per US EPA Method 5/202 (front and back half) or equivalent South Coast Air Quality Management District (SCAQMD) test method.
- Stack emissions assume an SCR and oxidation catalyst.
- Average temperature of the gas fuel is 410 °F. Sensible heat of the fuel is not included in the fuel heating values.
- Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement are strictly the customer's responsibility.

Table 8.1B.5d Siemens Performance Data for 65 F Ambient Conditions (10% Loads)



City of Vernon
Estimated SGT6-5000F Gas Turbine Performance
Combined Cycle / Dry Low NOx Combustor
SGen6-1000A / 0.90 Power Factor

Based on USAacb_Ar5b
 October 11, 2005

SITE CONDITIONS:	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11
FUEL TYPE	Natural Gas										
LOAD LEVEL	BASE	90%	80%	70%	60%	50%	40%	30%	20%	10%	FSNL
NET FUEL HEATING VALUE, Btu/lbm (LHV)	21074	21074	21074	21074	21074	21074	21074	21074	21074	21074	21074
GROSS FUEL HEATING VALUE, Btu/lbm (HHV)	23397	23397	23397	23397	23397	23397	23397	23397	23397	23397	23397
EVAPORATIVE COOLER STATUS/EFFECTIVENESS	OFF										
AMBIENT DRY BULB TEMPERATURE, °F	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
AMBIENT WET BULB TEMPERATURE, °F	56.6	56.6	56.6	56.6	56.6	56.6	56.6	56.6	56.6	56.6	56.6
AMBIENT RELATIVE HUMIDITY, %	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
BAROMETRIC PRESSURE, psia	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600	14.600
COMPRESSOR INLET TEMPERATURE, °F	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
INLET PRESSURE LOSS, in. H2O (Total)	4.5	3.9	3.3	2.8	2.4	2.0	1.9	1.9	1.9	1.9	1.9
EXHAUST PRESSURE LOSS, in. H2O (Total)	22.3	19.3	16.8	14.4	12.2	10.3	9.3	8.5	7.8	7.1	6.4
EXHAUST PRESSURE LOSS, in. H2O (Static)	19.1	16.5	14.3	12.3	10.4	8.8	7.9	7.3	6.6	6.0	5.4
INJECTION FLUID	---	---	---	---	---	---	---	---	---	---	---
INJECTION RATIO	---	---	---	---	---	---	---	---	---	---	---
GAS TURBINE PERFORMANCE:											
FUEL FLOW, lbm/hr	81965	75030	68666	62142	55758	49743	43790	37319	30456	24011	18041
INJECTION RATE, lbm/hr	---	---	---	---	---	---	---	---	---	---	---
HEAT INPUT, mmBtu/hr (LHV)	1727	1581	1447	1310	1175	1048	923	786	642	506	380
HEAT INPUT, mmBtu/hr (HHV)	1918	1755	1607	1454	1305	1164	1025	873	713	562	422
EXHAUST TEMPERATURE, °F	1100	1100	1100	1100	1100	1100	1027	921	817	711	612
EXHAUST FLOW, lbm/hr	3915152	3627509	3369311	3111135	2863004	2630983	2555080	2548309	2541684	2535138	2529188
EXHAUST GAS COMPOSITION (% BY VOLUME):											
OXYGEN	12.68	12.77	12.89	13.04	13.23	13.46	14.17	15.17	16.17	17.16	18.07
CARBON DIOXIDE	3.69	3.64	3.59	3.52	3.43	3.33	3.00	2.55	2.09	1.64	1.23
WATER	8.44	8.35	8.25	8.11	7.95	7.73	7.10	6.20	5.31	4.42	3.60
NITROGEN	74.33	74.36	74.40	74.45	74.52	74.60	74.85	75.20	75.54	75.89	76.21
ARGON	0.87	0.87	0.87	0.87	0.87	0.88	0.88	0.88	0.89	0.89	0.89
MOLECULAR WEIGHT	28.37	28.37	28.38	28.39	28.40	28.41	28.45	28.51	28.57	28.62	28.68
NET EMISSIONS: Based on USEPA test methods											
NOx, ppmvd @ 15% O2	9	9	9	9	9	15	45	45	45	50	30
NOx, lbm/hr as NO2	64.4	59.0	54.0	48.8	43.8	64.9	170	143	117	100	44
CO, ppmvd @ 15% O2	4	4	4	4	10	150	700	1800	1800	3000	4000
CO, lbm/hr	17.4	16.0	14.6	13.2	29.6	395.1	1612	3484	2837	3662	3587
SO2, lbm/hr	2.0	1.8	1.7	1.5	1.3	1.2	1.1	0.9	0.7	0.6	0.4
VOC, ppmvd @ 15% O2 as CH4	1.0	1.0	1.0	1.0	5.0	30.0	50.0	75.0	60.0	120.0	300.0
VOC, lbm/hr as CH4	2.5	2.3	2.1	1.9	8.5	45.2	65.8	83.0	54.0	83.7	153.7
PARTICULATES, lbm/hr	9	8	8	8	8	8	11	11	11	11	11
OPACITY, %	10	10	10	10	10	10	10	10	10	10	10

NOTES:

- Performance is based on new and clean condition.
- All data is estimated and not guaranteed.
- VOC's consist of total hydrocarbons excluding methane and ethane is expressed in terms of methane.
- Gas fuel composition [% vol] is 97.9594% CH4, 1.149% C2H6, 0.0113% iC4H10, 0.017 nC4H10, 0.00228% iC5H12, 0.00228% nC5H12, 0.00382% C6H14, 0.3876% N2, 0.4673% CO2, and 0.35 gr S/100 scf.
- Gas fuel must be in compliance with the SIEMENS Gas Fuel Spec (21T0306 Rev.11).
- Particulates are per US EPA Method 5/202 (front and back half).
- Average temperature of the gas fuel is 410°F. Sensible heat of the fuel is not included in the fuel heating values.
- Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement are strictly the customer's responsibility.

SIEMENS**City of Vernon**

Based on: USAacb_Arev5_ab; USAacb_Arev2_v; and USAacb_Arev5_v

Estimated SGT6-5000F Gas Turbine Performance
Combined Cycle / Dry Low NOx Combustor
SGen6-1000A / 0.90 Power Factor

May 8, 2006

SITE CONDITIONS:

	Theoretical Max. DB @ 65 °F	Theoretical Max. DB @ 93 °F	Expected DB @ 65 °F	Expected DB @ 93 °F
FUEL TYPE	Natural Gas	Natural Gas	Natural Gas	Natural Gas
LOAD LEVEL	BASE	BASE	BASE	BASE
NET FUEL HEATING VALUE, Btu/lbm (LHV)	21,074	21,074	21,074	21,074
GROSS FUEL HEATING VALUE, Btu/lbm (HHV)	23,397	23,397	23,397	23,397
EVAPORATIVE COOLER STATUS/EFFECTIVENESS	85%	85%	85%	85%
AMBIENT DRY BULB TEMPERATURE, °F	65.0	93.0	65.0	93.0
AMBIENT WET BULB TEMPERATURE, °F	56.6	70.1	56.6	70.1
AMBIENT RELATIVE HUMIDITY, %	60%	32%	60%	32%
BAROMETRIC PRESSURE, psia	14.600	14.600	14.600	14.600
COMPRESSOR INLET TEMPERATURE, °F	57.9	73.5	57.9	73.5
INLET PRESSURE LOSS, in. H ₂ O (Total)	4.6	4.3	4.6	4.3
EXHAUST PRESSURE LOSS, in. H ₂ O (Total)	23.0	21.4	23.0	21.4
EXHAUST PRESSURE LOSS, in. H ₂ O (Static)	19.6	18.3	19.6	18.3

GAS TURBINE PERFORMANCE:

FUEL FLOW, lbm/hr - GT Only	83,768	80,061	83,768	80,061
FUEL FLOW, lbm/hr - DB Only	10,258	10,258	6,786	7,260
HEAT INPUT, mmBtu/hr (LHV) - GT Only	1,765	1,687	1,765	1,687
HEAT INPUT, mmBtu/hr (HHV) - GT Only	1,960	1,873	1,960	1,873
HEAT INPUT, mmBtu/hr (LHV) - DB Only	216	216	132	135
HEAT INPUT, mmBtu/hr (HHV) - DB Only	240	240	147	150
EXHAUST TEMPERATURE, °F - GT	1,095	1,111	1,095	1,111
EXHAUST FLOW, lbm/hr - GT + DB	3,986,735	3,819,299	3,982,760	3,815,452

EXHAUST GAS (HRSG STACK) COMPOSITION (% BY VOLUME):

OXYGEN	11.64	11.47	12.01	11.84
CARBON DIOXIDE	4.14	4.13	3.97	3.97
WATER	9.57	10.39	9.24	10.06
NITROGEN	73.79	73.15	73.92	73.27
ARGON	0.87	0.86	0.87	0.86
MOLECULAR WEIGHT	28.28	28.19	28.30	28.21

GAS TURBINE EMISSIONS: Based on USEPA or SCAQMD test methods

NO _x ppmvd @ 15% O ₂	9	9	9	9
NO _x lb _m /hr as NO ₂	65.8	62.9	65.8	62.9
CO, ppmvd @ 15% O ₂	4	4	4	4
CO, lb _m /hr	17.8	17.0	17.8	17.0
SO ₂ , lb _m /hr	2.9	2.7	2.9	2.7
VOC, ppmvd @ 15% O ₂ as CH ₄	1.0	1.0	1.0	1.0
VOC, lb _m /hr as CH ₄	2.5	2.4	2.5	2.4
PARTICULATES, lb _m /hr	8.3	8.0	8.0	8.0
OPACITY, %	10	10	10	10

STACK EMISSIONS: Based on USEPA or SCAQMD test methods

NO _x ppmvd @ 15% O ₂	2	2	2	2
NO _x lb _m /hr as NO ₂	16.5	15.8	15.8	15.2
NH ₃ (Ammonia) Slip, ppmvd @ 15% O ₂	5	5	5	5
CO, ppmvd @ 15% O ₂	2	2	2	2
CO, lb _m /hr	10.0	9.7	9.6	9.2
SO ₂ , lb _m /hr	2.3	2.2	2.2	2.0
VOC, ppmvd @ 15% O ₂ as CH ₄	2	2	2	2
VOC, lb _m /hr as CH ₄	5.8	5.5	5.5	5.3
PARTICULATES, lb _m /hr	11.9	11.5	10.9	10.4
OPACITY, %	10	10	10	10

NOTES:

- Performance is based on new and clean condition.
- All data is estimated and not guaranteed.
- VOC consist of total hydrocarbons excluding methane and ethane and are expressed in terms of methane (CH₄).
- Gas fuel composition (% by volume unless otherwise noted) is: 97.9594 CH₄, 1.149 C₂H₆, 0.0113 iC₄H₁₀, 0.017 nC₄H₁₀, 0.00228 iC₃H₈, 0.00228 nC₃H₈, 0.00382 C₃H₄, 0.3876 N₂, 0.4673% CO₂ and 0.35 gr S/100 scf.
- Gas fuel must be in compliance with the SIEMENS Gas Fuel Spec (21T0306 Rev.11).
- Particulates are per US EPA Method 5/202 (front and back half) or equivalent South Coast Air Quality Management District (SCAQMD) test method.
- Stack emissions assume an SCR and oxidation catalyst.
- Average temperature of the gas fuel is 410 °F. Sensible heat of the fuel is not included in the fuel heating values.
- Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement are strictly the customer's responsibility.

SIEMENS**City of Vernon**

Based on USAacb_Arev2_v & USAacb_Arev5_v

**Estimated SGT6-5000F Gas Turbine Performance
Combined Cycle / Dry Low NOx Combustor
SGen6-1000A / 0.90 Power Factor**

May 8, 2006

SITE CONDITIONS:	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 1 + DB
FUEL TYPE	Natural Gas					
LOAD LEVEL	BASE	BASE	70%	60%	50%	BASE
NET FUEL HEATING VALUE, Btu/lbm (LHV)	21,074	21,074	21,074	21,074	21,074	21,074
GROSS FUEL HEATING VALUE, Btu/lbm (HHV)	23,397	23,397	23,397	23,397	23,397	23,397
EVAPORATIVE COOLER STATUS/EFFECTIVENESS	85%	OFF	OFF	OFF	OFF	85%
AMBIENT DRY BULB TEMPERATURE, °F	93.0	93.0	93.0	93.0	93.0	93.0
AMBIENT WET BULB TEMPERATURE, °F	70.1	70.1	70.1	70.1	70.1	70.1
AMBIENT RELATIVE HUMIDITY, %	32%	32%	32%	32%	32%	32%
BAROMETRIC PRESSURE, psia	14.600	14.600	14.600	14.600	14.600	14.600
COMPRESSOR INLET TEMPERATURE, °F	73.5	93.0	93.0	93.0	93.0	73.5
INLET PRESSURE LOSS, in. H ₂ O (Total)	4.3	4.1	2.6	2.2	1.9	4.3
EXHAUST PRESSURE LOSS, in. H ₂ O (Total)	21.4	19.7	12.8	10.9	9.3	21.4
EXHAUST PRESSURE LOSS, in. H ₂ O (Static)	18.3	16.9	10.9	9.3	8.0	18.3
GAS TURBINE PERFORMANCE:						
FUEL FLOW, lbm/hr - GT Only	80,061	75,078	57,200	51,537	44,660	80,061
FUEL FLOW, lbm/hr - DB Only	0	0	0	0	0	7,260
HEAT INPUT, mmBtu/hr (LHV) - GT Only	1,687	1,582	1,205	1,086	941	1,687
HEAT INPUT, mmBtu/hr (HHV) - GT Only	1,873	1,757	1,338	1,206	1,045	1,873
HEAT INPUT, mmBtu/hr (LHV) - DB Only	0	0	0	0	0	135
HEAT INPUT, mmBtu/hr (HHV) - DB Only	0	0	0	0	0	150
EXHAUST TEMPERATURE, °F - GT	1,111	1,125	1,125	1,125	1,135	1,111
EXHAUST FLOW, lbm/hr - GT + DB	3,809,041	3,634,784	2,903,781	2,685,226	2,477,963	3,815,452
EXHAUST GAS (HRSG STACK) COMPOSITION (% BY VOLUME):						
OXYGEN	12.45	12.71	13.07	13.26	13.49	11.84
CARBON DIOXIDE	3.68	3.63	3.47	3.38	3.27	3.97
WATER	9.52	8.74	8.42	8.25	8.04	10.06
NITROGEN	73.48	74.05	74.17	74.24	74.32	73.27
ARGON	0.86	0.87	0.87	0.87	0.87	0.86
MOLECULAR WEIGHT	28.25	28.33	28.35	28.36	28.37	28.21
GAS TURBINE EMISSIONS: Based on USEPA or SCAQMD test methods						
NO _x , ppmvd @ 15% O ₂	9	9	9	9	9	9
NO _x , lb _m /hr as NO ₂	62.9	59.0	44.9	40.5	35.1	62.9
CO, ppmvd @ 15% O ₂	4	4	4	10	15	4
CO, lb _m /hr	17.0	16.0	12.2	27.4	35.6	17.0
SO ₂ , lb _m /hr	2.7	2.6	2.0	1.8	1.6	2.7
VOC, ppmvd @ 15% O ₂ as CH ₄	1.0	1.0	1.0	5.0	5.0	1.0
VOC, lb _m /hr as CH ₄	2.4	2.3	1.7	7.8	6.8	2.4
PARTICULATES, lb _m /hr	8.0	8.0	8.0	8.0	8.0	8.0
OPACITY, %	10	10	10	10	10	10
STACK EMISSIONS: Based on USEPA or SCAQMD test methods						
NO _x , ppmvd @ 15% O ₂	2	2	2	2	2	2
NO _x , lb _m /hr as NO ₂	14.0	13.2	10.0	9.0	8.1	15.2
NH ₃ (Ammonia) Slip, ppmvd @ 15% O ₂	5	5	5	5	5	5
CO, ppmvd @ 15% O ₂	2	2	2	2	3	2
CO, lb _m /hr	8.6	8.0	6.1	5.5	7.4	9.2
SO ₂ , lb _m /hr	2.0	1.9	1.4	1.3	1.2	2.0
VOC, ppmvd @ 15% O ₂ as CH ₄	1	1	1	2	2	2
VOC, lb _m /hr as CH ₄	2.5	2.3	1.8	3.2	2.9	5.3
PARTICULATES, lb _m /hr	8.9	8.5	8.0	8.0	8.0	10.4
OPACITY, %	10	10	10	10	10	10

NOTES:

- Performance is based on new and clean condition.
- All data is estimated and not guaranteed.
- VOC consist of total hydrocarbons excluding methane and ethane and are expressed in terms of methane (CH₄)
- Gas fuel composition (% by volume unless otherwise noted) is: 97.9594 CH₄, 1.149 C₂H₆, 0.0113 iC₄H₁₀, 0.017 nC₄H₁₀, 0.00228 iC₅H₁₂, 0.00228 nC₅H₁₂, 0.00382 C₆H₁₄, 0.3876 N₂, 0.4673% CO₂ and 0.35 gr S/100 scf.
- Gas fuel must be in compliance with the SIEMENS Gas Fuel Spec (21T0306 Rev.11).
- Particulates are per US EPA Method 5/202 (front and back half) or equivalent South Coast Air Quality Management District (SCAQMD) test method.
- Stack emissions assume an SCR and oxidation catalyst.
- Average temperature of the gas fuel is 410 °F. Sensible heat of the fuel is not included in the fuel heating values.
- Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement are strictly the customer's responsibility.

Table 8.1B.6a Emission Estimates- Turbine Startup and Shutdown

Hot-Warm Start

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack Exhaust				
		Minutes	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr	MW	ACFM
		HHV					NO _x	CO	VOC	SO ₂	PM ₁₀	NO _x	CO	VOC	SO ₂	PM ₁₀					
0 - Baseload	33	779	33027	0.763	unspecified	unspecified	51.1	481	57.5	0.83	8	28.1	264.8	31.6	0.46	4.5	187	2775463	28.49	765856	12.38
Baseload	27	2062	88140	2.037	Full	Full	15.4	9.4	2.7	1.22	10	6.9	4.2	1.2	0.55	4.5	202	4164447	28.44	1177686	19.04

Include baseload for modeling purposes only - Do not sum these emissions in event - Event ends at reaching baseload

Total per turbine (lb/hr)	35.0	269.0	32.8	1.01	9.0
Total per turbine (lb/start)	28.1	264.8	31.6	0.46	4.5
Total 3 turbines (lb/hour)	105.1	807.1	98.4	3.0	27.0
Total 3 turbines (lb/start)	84.3	794.4	94.8	1.4	13.5

Cold Start

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack Exhaust				
		Minutes	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr	MW	ACFM
							NO _x	CO	VOC	SO ₂	PM ₁₀	NO _x	CO	VOC	SO ₂	PM ₁₀					
0 - 70%	29	596	25266	0.584	unspecified	unspecified	60.4	568	67.4	0.73	8	29.2	274.3	32.6	0.35	3.9	187	2775463	28.49	765856	12.38
Baseload	31	2062	88140	2.037	Full	Full	15.4	9.4	2.7	1.22	10	8.0	4.9	1.4	0.6	5.2	202	4164447	28.44	1177686	19.04

Include baseload for modeling purposes only - Do not sum these emissions in event - Event ends at reaching 70 percent load

Total per turbine (lb/hr)	37.2	279.2	34.0	0.98	9.1
Total per turbine (lb/start)	29.2	274.3	32.6	0.35	3.9
Total 3 turbines (lb/hour)	111.5	837.5	102.0	2.9	27.2
Total 3 turbines (lb/start)	87.6	822.9	97.8	1.1	11.7

Shutdown

Turbine Load	Duration	Fuel Flow			Catalyst Efficiencies		Emission Rates					Emissions					Stack (d)				
		Minutes	mmBtu/hr	lbm/hr	10^6ft3/hr	CO	SCR	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lbm	lbm	lbm	lbm	lbm	Temp	lbm/hr	MW	ACFM
		HHV					NO _x	CO	VOC	SO ₂	PM ₁₀	NO _x	CO	VOC	SO ₂	PM ₁₀					
Shutdown from Baseload	44	1115	47288	1.093	unspecified	unspecified	29.3	119	13.9	0.89	7	21.5	87.2	10.2	0.66	5.4	187	2775463	28.49	765856	12.38
Baseload	16	2062	88140	2	Full	Full	15.4	9.4	2.7	1.2	10	4.1	2.5	0.7	0.33	2.7	202	4164447	28.44	1177686	19.04

Include the baseload for modeling purposes only - do not sum these emissions in the event

Event begins when turbine begins to ramp in shutdown mode from baseload to the opening of the breakers

Total per turbine (lb/hr)	25.6	89.7	10.9	1.0	8.1
Total per turbine (lb/shutdown)	21.5	87.2	10.2	0.7	5.4
Total 3 turbines (lb/hr)	76.8	269.1	32.8	2.9	24.2
Total 3 turbines (lb/shutdown)	64.5	261.6	30.6	2.0	16.2

Notes:

- (a) - Siemens Estimated HRSG Exhaust Stack Exit (Tip) Temperatures (F)
- (b) - Siemens Estimated SGT6-5000F Gas Turbine Performance - 35°F, dated 5/8/06
- (c) Assume a fuel MW of 16.39545
- (d) Start/Shutdown exhaust parameters are from 35°F, 50 percent load case. Base load emissions from 35°F case.
- (e) SO₂ Emissions using the emission factor 0.6 lb SO₂ per mm cuft natural gas – Source: SCAQMD AER Program

Table 8.1B.6b Emission Estimates- Operational Turbine

Vernon Power Plant Emission Scenarios - Normal Operation

Normal Operation Scenario(1)					Fuel Input(1)(3)			Fuel Flow(1)(3)(4)			Exhaust Flow	Emissions														
Ambient Temp F	Siemens Date	RH %	Evap %	Load %	CT	Duct Burn MMBtu/hr (HHV)	Total	CT	Duct Burner	Total	lbm/hr	NOx(1)(3)			CO(1)(3)			VOC(1)(3)			Particulates(1)(3)			SO2(2)(3)		
								lbm/hr	lbm/hr	10^6 CU Ft/hr		lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr
35	05/08/2006	75	Off	Base	2062	0	2062	88140	0	2.037	4164447	15.4	369.6	134904	9.4	225.6	82344	2.7	64.8	23652	9.8	235.2	85848	1.22	29.34	10709
35	05/08/2006	75	Off	70	1560	0	1560	66669	0	1.541	3302254	11.7	280.8	102492	7.1	170.4	62196	2.1	50.4	18396	8.0	192	70080	0.92	22.19	8100
35	05/08/2006	75	Off	60	1396	0	1396	59683	0	1.380	3030561	10.5	252.0	91980	6.4	153.6	56064	3.7	88.8	32412	8.0	192	70080	0.83	19.87	7251
35	05/08/2006	75	Off	50	1238	0	1238	52918	0	1.223	2775450	9.3	223.2	81468	8.5	204.0	74460	3.3	79.2	28908	8.0	192	70080	0.73	17.61	6429
65	05/08/2006	60	85	Base+DB	1960	240	2200	83768	10258	2.174	3986735	16.5	396.0	144540	10.0	240.0	87600	5.8	139.2	50808	11.9	285.6	104244	1.30	31.30	11424
65	05/08/2006	60	85	Base	1960	0	1960	83768	0	1.936	3976477	14.7	352.8	128772	9.0	216.0	78840	2.6	62.4	22776	9.3	223.2	81468	1.16	27.88	10178
65	05/08/2006	60	Off	Base	1918	0	1918	81,965	0	1.895	3915152	14.4	345.6	126144	8.8	211.2	77088	2.5	60.0	21900	9.2	220.8	80592	1.14	27.28	9959
65	05/08/2006	60	Off	70	1454	0	1454	62142	0	1.436	3111135	10.9	261.6	95484	6.7	160.8	58692	1.9	45.6	16644	8.0	192	70080	0.86	20.69	7550
65	05/08/2006	60	Off	60	1305	0	1305	55758	0	1.289	2863004	9.8	235.2	85848	6.0	144.0	52560	3.4	81.6	29784	8.0	192	70080	0.77	18.56	6775
65	05/08/2006	60	Off	50	1160	0	1160	49593	0	1.146	2630983	8.7	208.8	76212	8.0	192.0	70080	3.1	74.4	27156	8.0	192	70080	0.69	16.51	6025
93	05/08/2006	32	85	Base	1873	0	1873	80061	0	1.851	3809041	14.0	336.0	122640	8.6	206.4	75336	2.5	60.0	21900	8.9	213.6	77964	1.11	26.65	9727
93	05/08/2006	32	OFF	70	1338	0	1338	57200	0	1.322	2903781	10.0	240.0	87600	6.1	146.4	53436	1.8	43.2	15768	8.0	192	70080	0.79	19.04	6950
93	05/08/2006	32	OFF	60	1206	0	1206	51537	0	1.191	2685226	9.0	216.0	78840	5.5	132.0	48180	3.2	76.8	28032	8.0	192	70080	0.71	17.16	6262
93	05/08/2006	32	OFF	50	1045	0	1045	44660	0	1.032	2424788	8.1	194.4	70956	7.4	177.6	64824	2.9	69.6	25404	8.0	192	70080	0.62	14.87	5426
93	05/08/2006	32	85	Base+DB	1873	240	2113	80061	10258	2.088	3819299	15.8	379.2	138408	9.7	232.8	84972	5.5	132.0	48180	11.5	276	100740	1.25	30.06	10974

(1) Source: Siemens Estimated SGT6-5000F Gas Turbine Performance Sheets for 35, 65, 93°F. Scenarios with DB are based on maximum theoretical emissions.

(2) SO2 Emissions using the emission factor 0.6 lb SO2 per mm cuft natural gas - Source: SCAQMD AER Program

(3) Per CTG

(4) Assume an exhaust MW of 16.39545 g/mol

Table 8.1B.6c Emission Estimates- Cooling Tower

Vernon Power Plant Cooling Tower Emissions
04/21/2006

Assumed

Cooling tower operates 8,760 hours per year at the design recirculation rate with 5 cycles of concentration.

Givens

Cooling Tower Recirculation Rate^a 168,088 GPM 84111235.2 Pounds/Hr

Drift Eliminator Efficiency^b 0.0005 Percent

Cooling Tower Cycles of Concentration 5

Drift 420.6 Pounds/Hr

Component ^c	Design Case Cooling Tower Influent (mg/L) ^c	Average Case Cooling Tower Influent (mg/L) ^c	Max. TDS for Cooling Tower Discharge (mg/L)	Annual Average TDS for Cooling Tower Discharge (mg/L)	Cooling Tower PM10/2.5 Emissions (Lb/Hr)	Annual Cooling Tower PM10/2.5 Emissions Tons/Year
Total Dissolved Solids	706	646	3530	3230	1.48	5.95

a. Siemens Email from M Pope dated 10/7/05 @ 12.44 pm

b. Cooling Tower BACT Level

c. CBMWD Water Quality Report for 2005-2005. Design TDS based on maximum recorded TDS in CBMWD reports. Average case TDS is based on the reported TDS average.

Cooling Tower Specifications

Length (feet)	385	
Width (feet)	104	
Height to Fan Deck (feet)	48	
Height to Fan Exit (feet)	58	Exit to Atmosphere.
Air Exit velocity (ft/min)	1,381	
Temperature (F)	93.3	
Number of Cells	14	2 rows of 7 cells.
Fan Shroud Diameter (feet)	30	

Table 8.1B.6d Emission Estimates- Fire Pump

Vernon Power Project - Diesel Engine Emissions Analysis
 Updated 5/30/06

Given: Cummins Model CFP6E-F35 (or equivalent) fire pump to be driven by 210 bHp-hr diesel engine

Assume: Current requirements are Tier 2 engine (SCAQMD BACT requirements) (ref: Section D of SCAQMD BACT Guidelines).

SCAQMD will restrict the use of this engine to 200 hours per year (Ref: Rule 1304(a)(4), Rule 1110.2(h)(2&3)
 The planned usage of this fire pump engine is to operate for 1/2 hour per week for maintenance and required testing.
 The SCAQMD will limit the engine to 50 hours per year of maintenance operation and testing, this then becomes the annual operating level used for criteria pollutant modeling purposes

Since the SCAQMD does not require criteria pollutant offsets from emergency engines (Rule 1304(a)(4), other than the NOx RTCs, as required by the RECLAIM Program (Regulation XX), the engine operation used to model criteria pollutant emissions is 1/2 hour per day and per week at full load for testing and 50 hours per year.

Fuel usage is	5.1 Gal/hr	0.0051 1000 Gal/hr
	5.1 Gal/day	0.0051 1000 Gal/day
	255 Gal/yr	0.255 1000 Gal/yr

Based on 10.2 gallons per hour fuel consumption.

Emission Factor and Fuel Usage Source - Cummins Engine Performance Dated 11/2004.

Rated Horsepower 210

Pollutant	Emission Factor Grams/Brake-Horsepower-Hour	Emissions			Modeling Emissions			
		lb/hr	lb/day	lb/yr	3hr (lb/hr)	8hr (lb/hr)	24hr (lb/hr)	Annual (lb/hr)
Hydrocarbon	0.09	0.02	0.02	1.0	-	-	-	-
Oxides of Nitrogen	4.17	0.97	0.97	48.3	-	-	4.02E-02	5.51E-03
Carbon Monoxide	0.45	0.1	0.1	5.2	-	1.30E-02	-	-
Particulates	0.075	0.02	0.02	0.9	-	-	7.23E-04	9.91E-05
Sulfur Dioxide ¹	-	0.001	0.001	0.1	3.60E-04	-	4.49E-05	6.16E-06

1. Calculated from fuel use of 10.2 gal/hr, fuel density of 7.05 lb/gal and 15 ppmw of SO2.

Exhaust Gas Parameters

Exhaust Flow	wacfm	1,051
Exhaust Temperature	deg. F	917
Exhaust Pipe Diameter	in	3
Exhaust Stack Height(1)	ft	16

(1) Engine is enclosed in a weather proof enclosure.

Table 8.1B.7a Toxic Emission Estimates- Operational Turbine

Vernon Power Plant Combustion Turbine Toxic Emissions Analysis
04/21/2006

Assume:

Maximum Heat Input Case: Operating Conditions at 65F baseload.⁽¹⁾
Operating Hours for each CTG. 8760 Hours/Year
Duct Burner Hours/Year 5000 Hours/Year

Given:

SCAQMD Rule 1401 is a permit unit evaluation - list emissions per turbine
CEC evaluation is plant wide - Combine emissions from both turbines
Evaluate potential HAPS for Gas Turbine NESHAPS applicability, 10 tpy single HAPS
or 25 TPY all HAPS - Plant wide evaluation

Gas Heat Content =	1020 MMBtu/MMSCF	1 CTG+DB	1 CTG+DB
	Hourly	Hourly	Annual
CTG Heat Input	1,960 MMBtu/Hr HHV	1.922 MMCF/Hr	16833 MMCF/Yr
DB Heat Input	240 MMBtu/Hr HHV	0.235294118 MMCF/Hr	1176 MMCF/Yr
Total Heat Input	2200 MMBtu/Hr HHV	2.157 MMCF/Hr	18009 MMCF/Yr

Compound	Emission Factor (Lb/MMCF) ^a	Maximum CTG and DB Heat Input		Turbine Emissions					
		(mmBtu/hr)	Gas Input (MMCF/hr)	lb/hr/CT	lb/hr/2-CT	lb/yr/CT	TPY/CT	lb/yr/3-CT	TPY/3-CT
Ammonia ^b	5 ppm	2,200	2.157	15.0	29.9	131177	65.6	393532	197
Acetaldehyde	0.0408	2,200	2.157	0.088	0.176	735	0.4	2204	1.1
Acrolein	0.00369	2,200	2.157	0.00796	0.016	66.5	0.03	199	0.10
Benzene	0.00333	2,200	2.157	0.0072	0.014	60	0.03	180	0.09
1,3-Butadiene	0.0004386	2,200	2.157	0.00095	0.0019	7.9	0.004	24	0.01
Ethylbenzene	0.03264	2,200	2.157	0.0704	0.141	588	0.29	1763	0.9
Formaldehyde	0.3672	2,200	2.157	0.792	1.584	6613	3.3	19839	9.9
Naphthalene	0.001326	2,200	2.157	0.0029	0.006	23.9	0.01	72	0.04
PAHs ^c	0.000014	2,200	2.157	0.00003	0.00006	0.3	0.0001	1	0.0004
Propylene Oxide	0.02958	2,200	2.157	0.0638	0.128	533	0.3	1598	0.80
Toluene	0.1326	2,200	2.157	0.286	0.572	2388	1.2	7164	3.6
Xylene	0.06528	2,200	2.157	0.141	0.282	1176	0.6	3527	1.8
TOTAL HAPS						12191	6.1	36572	18.3

Notes:

⁽¹⁾ Source - Siemens - Estimated Theoretical Max Performance and Emissions at 65F, dated May 8, 2006

^a Obtained from AP-42 Table 3.1-3 revised 4/00 for natural gas-fired combustion turbines. Formaldehyde, Benzene, and Acrolein emission factors are from the Background document for AP-42 Section 3.1, Table 3.4-1 for a natural gas fired combustion turbine with an oxidation catalyst.

^b Based on an exhaust NH₃ limit of 5 ppmv @ 15% O₂ and a F-factor of 8710.

^c Carcinogenic PAHs only; naphthalene considered separately. Emission Factor based on two separate source tests (2002 and 2004) from the Delta Energy Center located in Pittsburg, CA.

Table 8.1B.7b Toxic Emission Estimates- Cooling Tower

Vernon Power Plant Cooling Tower Toxics Emissions Analysis
04/21/2006

Assumed:

Cooling tower operates 8,760 hours per year at the design recirculation rate with 5 cycles of concentration.
Source of Water Quality Data: CBMWD 2004-2005 sampling results.

Given:

Cooling Tower Recirculation Rate^a 168,088 GPM 84,111,235 Pounds/Hr
 Drift Eliminator Efficiency^b 0.0005 Percent
 Cooling Tower Cycles of Concentration 5
 Drift 420.6 Pounds/Hr

Component ^c	Design Case Cooling Tower Influent (mg/L)	Annual Case Cooling Tower Influent (mg/L)	Design Case Cooling Tower Discharge (mg/L)	Average Case Cooling Tower Discharge (mg/L)	Hourly Emissions ^b (Lb/Hr)	Annual Emissions ^b (Lb/Year)
Chlorine	1	1	5	5	2.10E-03	18.4
Manganese (Mn)	0.07	0.03	0.35	0.15	1.47E-04	0.6
Cyanide (total)	0.01	0.006	0.05	0.03	2.10E-05	0.1
Arsenic	0.0021	0.0011	0.0105	0.0055	4.42E-06	0.02
Cadmium	0.4	0.2	2	1	8.41E-04	3.68
Chromium (as CR+6) ^c	0.0049	0.0034	0.0245	0.017	1.03E-05	0.06
Copper	0.057	0.057	0.285	0.285	1.20E-04	1.0
Lead	0.005	0.0015	0.025	0.0075	1.05E-05	0.03
Nickel	0.081	0.081	0.405	0.405	1.70E-04	1.5
Mercury	0.04	0.04	0.2	0.2	8.41E-05	0.737
Silver	0.41	0.154	2.05	0.77	8.62E-04	2.8
Zinc	0.091	0.056	0.455	0.28	1.91E-04	1.0
Barium	0.049	0.042	0.245	0.21	1.03E-04	0.8
Selenium	0.0012	0.0006	0.006	0.003	2.52E-06	0.01
Antimony	0.0021	0.0008	0.0105	0.004	4.42E-06	0.01
Beryllium	0.0005	0.0003	0.0025	0.0015	1.05E-06	0.006

- a. Burns and Roe Email from R Edelman dated 1/24/06 @ 2:13 pm
- b. Hourly emissions based on Design Case Water Quality and annual emissions based on average case water quality.
- c. Concentration data based on CBMWD Water Quality Reports for 2005-2005.

Table 8.1B.7c Toxic Emission Estimates- Fire Pump

Vernon Power Project Diesel Engine Toxic Air Contaminant Emissions Analysis
05/30/2006

Given:

Cummins Model CFP6E-F35 (or equivalent) fire pump to be driven by 210 bHp-hr diesel engine

Assume:

Current SCAQMD BACT requirements are Tier 2 USEPA Off Road Engine

Diesel Fuel usage at full load is 10.2 gallons/hr.

SCAQMD will restrict the use of this engine to 200 hours per year for total use, including emergency use

Scheduled usage is 1/2 hour per week for testing - This is the expected engine usage

For the risk assessment, the usage of the engine in emergency was assumed at

200 hours per year and one half hour per day.

Fuel usage is	5.1 Gal/hr	0.0051 1000 Gal/hr
	122.4 Gal/day	0.1224 1000 Gal/day
	1020 Gal/yr	1.02 1000 Gal/yr

Emission Factor Source - Ventura County APCD AB-2588 Combustion Emission Factors, dated May 17, 2001

Pollutant	Emission Factor lb/1000 gallons	Emissions		
		lb/hr	lb/day	lb/yr
Benzene	0.1863	0.001	0.02	0.19
Formaldehyde	1.7261	0.009	0.21	1.76
PAHs - Naphthalene	0.0559	0.0003	0.01	0.06
Naphthalene	0.0197	0.0001	0.002	0.02
Acetaldehyde	0.7833	0.004	0.10	0.80
Acrolein	0.0339	0.0002	0.004	0.03
1,3 Butadiene	0.2174	0.001	0.03	0.22
Chlorobenzene	0.0002	0.000001	0.00002	0.00
Dioxins	ND	ND	ND	ND
Furans	ND	ND	ND	ND
Propylene	0.467	0.002	0.06	0.48
Hexane	0.0269	0.0001	0.003	0.03
Toluene	0.1054	0.001	0.01	0.11
Xylenes	0.0424	0.0002	0.01	0.04
Ethyl Benzene	0.0109	0.0001	0.001	0.01
Hydrogen Chloride	0.1863	0.001	0.02	0.19
Arsenic	0.0016	0.00001	0.0002	0.00
Beryllium	ND	ND	ND	ND
Cadmium	0.0015	0.00001	0.0002	0.00
Total Chromium	0.0006	0.000003	0.0001	0.00
Hexavalent Chromium	0.0001	0.000001	0.00001	0.00
Copper	0.0041	0.00002	0.001	0.00
Lead	0.0083	0.00004	0.001	0.01
Manganese	0.0031	0.00002	0.0004	0.00
Mercury	0.002	0.00001	0.0002	0.00
Nickel	0.0039	0.00002	0.0005	0.00
Selenium	0.0022	0.00001	0.0003	0.00
Zinc	0.0224	0.0001	0.003	0.02

Exhaust Gas Parameters

Exhaust Flow	wacfm	1,051
Exhaust Temperature	deg. F	917
Exhaust Pipe Diameter	in	3
Exhaust Stack Height	ft	16

Table 8.1B.7d Toxic Emission Estimates- Total VPP

Total VPP TAC Emissions
05/30/2006

Compound	CTGs TPY	Cooling Tower TPY	Diesel Engine TPY	Total TPY
Ammonia	197	-	-	197
Acetaldehyde	1.1	-	0.0004	1.1
Acrolein	0.1	-	0.00002	0.1
Benzene	0.09	-	0.0001	0.09
1,3-Butadiene	0.01	-	0.0001	0.01
Ethylbenzene	0.9	-	0.00001	0.9
Formaldehyde	9.9	-	0.001	9.9
Naphthalene	0.04	-	0.00001	0.04
PAHs	0.0004	-	0.0000	0.0004
Propylene Oxide	0.8	-	-	0.8
Toluene	3.6	-	0.0001	3.6
Xylene	1.8	-	0.00002	1.8
Chlorine	-	0.009	-	0.01
Manganese (Mn)	-	0.0003	0.000002	0.0003
Cyanide (total)	-	0.00006	-	0.00006
Arsenic	-	0.00001	0.000001	0.00001
Cadmium	-	0.00184	0.000001	0.00184
Hexavalent Chromium	-	0.00003	0.0000001	0.00003
Copper	-	0.0005	0.000002	0.0005
Lead	-	0.00001	0.00000	0.00002
Nickel	-	0.0007	0.000002	0.0007
Mercury	-	0.000368	0.000001	0.000369
Silver	-	0.00142	-	0.00142
Zinc	-	0.0005	0.00001	0.0005
Barium	-	0.0004	-	0.0004
Selenium	-	0.000006	0.000001	0.00001
Antimony	-	0.00001	-	0.00001
Beryllium	-	0.000003	-	0.000003
Total Emissions (including Ammonia)				215
Total TAC Emissions				18.3
Highest Individual TAC				9.9

Table 8.1B.8 Oil Water Separator VOC Emissions Estimate

VPP Oil Water Separator Emission Estimate

Results per Oil Water Separator

	Annual Emission (lb/year)	Daily Emissions (lb/day)	Hourly Emissions (lb/hr)
VOC ^a	1.2311	0.003	0.0001

^a Emissions based on 325 gallons per minute throughput for each unit. Emissions are for each unit.

Emissions are conservatively evaluated using higher vapor pressure distillate oil, rather than actual lube oil that would be used in gas turbine service. Further, the gallon per year input to the Tanks model assumed that all the liquid would be the distillate oil, rather than rain water with small amounts of lube oil.

Based on a review of the Turbine Oil MSDS, no toxic air contaminants are expected to be emitted by the Oil Water Separator.

Table 8.1B.9 Fire Pump Fuel Tank Emissions Estimate

VPP Diesel Fire Pump Fuel Tank Emission Estimate

**TANKS 4.0.9d
Emissions Report - Brief Format
Individual Summaries**

Emissions Report for: Annual

VPP3 Fire Pump Diesel Tank - Horizontal Tank

Components	Losses(lbs)			VOC Emissions		
	Working Loss	Breathing Loss	Total Emissions	Lb/Year	Lb/Day	TPY
Distillate fuel oil no. 2	0.03	0.55	0.57	0.57	0.002	0.0003

Tank Dimensions

Shell Length (ft): 10
 Diameter (ft): 4
 Volume (gallons): 400 3.24
 Turnovers: 2
 Net
 Throughput(gal/yr): 800

Is Tank Heated (y/n): N
 Is Tank Underground
 (y/n): N

Paint Characteristics

Shell Color/Shade: Gray/Medium
 Shell Condition: Good

Breather Vent Settings

Vacuum Settings
 (psig): -0.03
 Pressure Settings
 (psig): 0.03

Meteorological Data used in Emissions Calculations: Los Angeles C.O., California (Avg Atmospheric Pressure = 14.67 psia)

Based on a review of the ARCO ECD-1 MSDS, no toxic air contaminants are expected to be emitted by the fire pump fuel tank.